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Commercial Space in China: Policies, Market and Discourses in the Launch Sector

A Puzzle Rather Than a Masterplan

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Résumé et mots clés

Cette thèse s'intéresse à l'émergence et aux caractéristiques des activités spatiales commerciales en Chine, avec une attention particulière portée au secteur des lanceurs. Face à la rareté et à la relative superficialité, des travaux disponibles en langue anglaise sur ce sujet, la recherche s'appuie sur des sources en mandarin et deux enquêtes de terrain, en combinant des méthodes qualitatives et quantitatives. L'objectif est de proposer une analyse approfondie des acteurs, des politiques, des dynamiques de marché et des discours qui structurent ce secteur en recomposition.

L'étude s'articule en cinq parties. La première examine les cadrages conceptuels du « spatial commercial » dans la littérature spécialisée en mandarin. La deuxième analyse le cadre politique et réglementaire à travers l'étude de documents politiques, programmatiques et règlementaires. La troisième évalue les tendances du marché à partir des données relatives à l'offre et à la demande dans le secteur des lanceurs. La quatrième présente une analyse des structures d'actionnariat et des données financières des principales entreprises du secteur. La cinquième étudie les discours produits par différents acteurs, à partir d'entretiens de terrain et d'une observation des publications officielles sur WeChat.

Les résultats mettent en évidence un écosystème fragmenté et hybride, où entreprises d'État, spin-offs d'institutions publiques et entreprises privées coexistent au sein de cadres politiques ambigus et d'une régulation inégale. Si les autorités centrales ont progressivement adopté un discours favorable à la commercialisation, ce processus demeure non linéaire, conflictuel et souvent opaque. La catégorie même de « commercial » s'avère instable et sujette à des appropriations concurrentes.

Plutôt que d'interpréter ce secteur comme un projet étatique unifié ou une simple reproduction des modèles occidentaux, cette thèse met en lumière la diversité des acteurs, l'imbrication des logiques politiques et économiques, et les tensions entre discours de libéralisation et maintien d'un contrôle structurel par l'État.

Mots clés : Chine ; spatial commercial ; New Space ; lancement spatial ; politique spatiale

Abstract and Keywords

This dissertation focuses on the emergence and characteristics of commercial space activities in China, with particular attention to the launch sector. In light of the scarcity—and at times superficiality—of English-language studies on this subject, the research draws on Mandarin-language sources and empirical fieldwork, combining qualitative and quantitative research methods. The aim is to provide an in-depth analysis of the actors, policies, market dynamics, and discourses shaping this rapidly evolving sector.

The study is organized into five parts. The first examines the definition and scope of “commercial space” as presented in Mandarin-language specialized literature. The second analyzes the political and regulatory environment through a study of policies, regulatory and programmatory texts. The third assesses market trends based on data related to supply and demand in the launch sector. The fourth presents an analysis of the shareholding structures and financial data of key industry players. The fifth investigates the discourses produced by various stakeholders, drawing on field interviews and an observation of official WeChat publications.

The findings reveal a fragmented and hybrid ecosystem in which state-owned enterprises, spin-offs from public institutions, and private firms coexist within ambiguous policy frameworks and uneven regulatory oversight. While central authorities have gradually adopted a discourse favorable to commercialization, the process remains non-linear, contested, and often opaque. The very notion of "commercial" proves unstable and subject to competing appropriations.

Rather than interpreting this sector as a unified state-led project or a simple replication of foreign models, the dissertation highlights the diversity of actors, the entanglement of political and economic logics, and the tensions between liberalizing discourse and the continued structural dominance of the state.

Keywords:
China, commercial space, New Space, space launch, space policy

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Abbreviations

AVIC – Aviation Industry Corporation of China

CAS – Chinese Academy of Sciences

CASC – China Aerospace Science and Technology Corporation

CASIC – China Aerospace Science and Industry Corporation

CGSTL – Chang Guang Satellite Technology Co., Ltd.

CLMR – China Long March Rocket Co., Ltd.

CNES – Centre National d'Études Spatiales (French Space Agency)

CNKI – China National Knowledge Infrastructure

CNSA – China National Space Administration

CSC – China Scholarship Council

CMSA – China Manned Space Agency

ESA – European Space Agency

GWIC – Great Wall Industry Corporation

IPO – Initial Public Offering

MIIT – Ministry of Industry and Information Technology

NDRC – National Development and Reform Commission

PRC – People's Republic of China

SAST – Shanghai Academy of Spaceflight Technology

SASTIND – State Administration of Science, Technology and Industry for National Defence

SEZ – Special Economic Zone

SOE – State-Owned Enterprise

VC – Venture Capital

VTVL – Vertical Takeoff, Vertical Landing

WTO – World Trade Organization

Introduction

Foreword

During my first major fieldwork session for this PhD, at the China Space Conference (CSC) held in Hefei in April 2023, I found myself riding a shuttle bus between the hotel and the venue as a rain shower passed overhead. Seated beside me was a woman who looked to be in her fifties. She initiated a friendly conversation, asking me where I was from and how I learnt mandarin. After introducing myself, I then asked which unit she worked for. She turned to me with a sudden shift in tone, cold and enigmatic, to reply bluntly: "A relevant unit" [相关单位 *xiangguan danwei*]. The conversation ended there. The rest of the ride unfolded in silence, broken only by the sound of raindrops falling against the window.

Her cryptic response lingered with me. It stood in stark contrast to the open and easy exchanges I had experienced since my arrival, particularly with representatives of commercial space companies at the CSC industry fair. It also brought me back to a common perception about space activities in China which worried me before my departure: that the field is largely opaque and that conducting research within it is nearly impossible. This, however, is an assumption challenged in this research, as I argue it does not apply to the sector as a whole. Although her answer was deliberately vague and offered no way to verify it, I strongly suspect the woman on the shuttle worked in the state-run -also known as *traditional*- space sector rather than in the commercial one.

"Chinese space activities are opaque at best."[1] Kazuto Suzuki's statement, perhaps tinged with irony, encapsulates the challenges of accessing information on the organization of China's institutional space activities. The reputation of China's space sector as opaque and enigmatic extends even into popular culture, both in North America and China. In *The Martian*[2], it is a covertly planned Chinese launch that ultimately enables the rescue of astronaut Mark Watney, stranded on Mars after the failure of the initial rescue mission. In the first opus of his *Three-Body Problem* trilogy[3], Liu Cixin explores the dramatic consequences of a classified military space program conducted during the Cultural Revolution, in which a traumatized astrophysicist, Ye Wenjie, voluntarily makes contact with a hostile extraterrestrial civilization.

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[1] Kazuto Suzuki, "Space Policies of Japan, China and India: Comparative Policy Logic Analysis," 2019, https://www.semanticscholar.org/paper/Space-Policies-of-Japan%2C-China-and-India%3A-Policy-Suzuki-Kazuto/35e5d868d2b44da3762fc8271ab98a6d5f28b406.
[2] Andy Weir, *The Martian*, Reprint édition (New York, NY: Random House Publishing Group, 2014).
[3] Cixin Liu, *The Three-Body Problem*, trans. Ken Liu, Reprint edition (New York: Tor Books, 2016).

During academic presentations and public talks in France, I was frequently confronted with the question of how I was able to access information on my research topic, commercial space, raised by both professionals and outsiders to the space sector. Reactions ranged from surprise to outright suspicion when I explained that, in reality, I faced an overabundance of written sources, both primary and secondary, and that field interviews posed much less difficulties than expected once the language barrier was overcome, in several occasions extending over entire afternoons.

In particular, the very existence of a commercial space sector in the People's Republic of China (PRC) was called into question by the public during those presentations. For instance, a former French military officer made a concerted effort to convince me that all Chinese commercial space enterprises were merely fronts for military laboratories, directly contradicting the demonstration I had just laid out.

A similar skepticism emerges in a study conducted by Kathryn Walsh, Ian Christensen, and Rob Ronci examining U.S. space sector stakeholders' perceptions of Chinese commercial space:

"Of the 15 interviews conducted in the U.S. during this project, four were certain that commercial space companies exist in China, while four were certain that they do not."[4]

"A venture capitalist specializing in space investments expressed direct skepticism: 'A commercial space sector without state-owned industry backing or government tentacles? I don't know... I'm pretty sure there's probably some linkage to the government somehow.'"[5]

It is noteworthy that this very question—whether a commercial space sector or private enterprises exists in the PRC—also arose regularly in my interactions in China, though typically from friends or individuals outside the space industry. A striking borderline case was a journalist for a local outlet I met during my preliminary fieldwork at the 2019 CSC in Changsha. When I mentioned that I was researching private [民营 *minying* in mandarin] launch companies, she reacted with wide-eyed disbelief, asserting that such companies simply did not exist in the space sector. This was despite the fact that she was covering the event, one in which an entire

[4] Kathryn Walsh, Ian Christensen, and Bob Ronci, "Lost Without Translation: Identifying Gaps in U.S. Perceptions of the Chinese Commercial Space Sector" (Secure World Fundation, Caelus Fundation, February 2021), https://swfound.org/media/207116/swf_caelus_lost_without_translation_identifying_gaps_in_us_perceptions_of_the_chinese_commercial_space_sector_2021.pdf. p.15

[5] Kathryn Walsh, Christensen, and Ronci. p.22

sub-forum was dedicated to commercial space, the *Commercial Space Industry International Forum*, at a time when the concept was at the height of its popularity as we will see Chapter I.

Within China's space industry, however, the existence of a commercial space sector is not in doubt. Its definition however, is wildly debated, a discussion that is covered in Part 1 of this dissertation, particularly in Chapter II. Commercial space is generally perceived as being more open than the so-called "traditional" space sector. This distinction was verbalized during an informal discussion with a junior employee at a commercial space satellite manufacturing company, who remarked, *"When it's the public sector, everything is always more obscure",* a comment which also echoed the earlier encounter with the mysterious woman on the shuttle.

It was precisely the greater accessibility of China's commercial space activities that partly justified the choice of the research topic for this dissertation. After a preliminary field research at the CSC in Changsha in 2019, it had seemed feasible to collect both documentary and interview-based materials to conduct a structured analysis on commercial segment of space activities in China, whereas other segments would have been significantly harder to access. This preference for commercial space research over other space-related topics was echoed by a CAS specialist in the field whom I interviewed, who noted that other aspects of space activities, in particular military-related, were too sensitive for academic study (for interviews, see Table Chapter VII, here exchange no.16).

Also, as Yan Zhang and Denise Tsang put it *"The space industry is being privatized and rapidly evolving and it is useful to capture the change at this critical moment."*[6]. As we will explore in this Introduction, commercial space in China was reported at the onset of this research in 2019 as having expanded since the mid-2010s, it was and still is a subject gaining traction in specialized English-language analyses.

The choice was also made to focus on the launch segment as commercial space launcher enterprises offered a clear and identifiable starting point with their first launch attempts, which were closely aligned with the initial phase of this research. Hence, it was possible to witness their emergence and development from the outset.

I hope that this research can serve as an entry point for studying other segments of China's space activities. This could involve developing analytical tools, such as the distinction between commercial space and commercialization, which opens up historical dimensions and shifts in

[6] Yan Zhang and Denise Tsang, "Knowledge and Innovation Within Chinese Firms in the Space Sector," *Journal of the Knowledge Economy* 14, no. 3 (September 1, 2023): 2905–26, https://doi.org/10.1007/s13132-022-00935-w. p.2922

institutional actors during the 1970s and 1980s It could also involve mapping key institutions responsible for primary sources which were identified in Part 2 of this dissertation. Additionally, this research has contributed to building a network of interviewee in the commercial space sector based on mutual trust. One of the challenges of conducting field research was establishing contact with stakeholders in an industry perceived as largely inaccessible. Yet, I found it possible to develop relationships of trust and even friendship, despite the international climate making interpersonal exchanges particularly difficult, a situation highlighted in several interviews with Mathieu Grialou, representative of the French National Center for Space Studies (CNES) at the French Embassy in China, as well as expert reports.[7]

Scope of the Research Topic

Defining and Characterizing Commercial Space in the Chinese Context

This dissertation is titled: *Commercial Space in China: Policies, Market and Discourses in the Launch Sector.* This title reflects the topic, sources and organization of the dissertation.

The objective of space activities covered in this research is the utilization of satellites placed in orbit for service purposes: exploitation of remote sensing data, telecommunications, and navigation. Space activities can be divided into the following sectors: satellite manufacturing, launch, operation, ground segment, and space services. Satellite manufacturing and launch are sometimes called "upstream" sector, while operation data exploitation and space services are called "downstream" activities.

The research topic of the dissertation is *commercial space in China*. Our starting point is not the English terms "commercial space", but the original term in mandarin, 商业航天 *shangye hangtian*.

As will be discussed in the following subsection dedicated to the English-language literature on the topic, the definition of commercial space in the Chinese context has been the subject of much debate and questioning by English-speaking authors. This observation constitutes both the starting point and the main motivation behind this dissertation: to offer new research results, based primarily on Chinese sources, and framed around broad research questions: How is commercial space defined in the Chinese context? How can it be characterized?

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[7] Kathryn Walsh, Christensen, and Ronci, "Lost Without Translation." p.11, Irina Liu et al., "Evaluation of China's Commercial Space Sector" (Institute for Defense Analyses Science & Technology Policy Institute, September 2019), https://www.ida.org/-/media/feature/publications/e/ev/evaluation-of-chinas-commercial-space-sector/d-10873.ashx. p.8

This dissertation strives to offer a response by emphasizing the composite nature of both enterprises and investors in the launch sector, and by proposing a typology of companies based on ownership structure. To go further, both quantitative and qualitative analyses are conducted to best characterize these actors in the launch sector.

One possible definition of commercial space in China, based on the findings of this research, would be to consider it as *a diversification of both investors, including private investment, and enterprises, including private ones, operating in the upstream segment of space activities*.

This dissertation focuses specifically on the topic of commercial space within the People's Republic of China (PRC) or mainland China, hereinafter also simply designated as China. The deliberate choice was made to formulate it as "commercial space in China" rather than the more commonly turn of phrase "Chinese commercial space", as in underlines the global nature of commercial space and New Space phenomena beyond its characteristics in China. As we will see further in the next subpart, an enduring narrative exists that tend to qualify Chinese space activities as one of a dangerous other, a posture that may influence the way the English-language literature addresses commercial space developments in China.

Indeed, the ambiguous nature of *shangye hangtian* is frequently presented as a uniquely Chinese phenomenon, shaped by the country's national conditions. This research does not seek to deny those specificities—on the contrary, it has attempted to define them in detail. However, it is important to note that ambiguity is not exclusive to the Chinese context. In the Anglophone world as well, the notion of "commercial space" lacks a stable definition. Xavier Pasco, in his work on the emergence of "New Space" in the United States, observed that "*there is not one New Space, but several,*" underlining the plurality and contested nature of the concept—even among stakeholders in the United States.

It is also likely that the Mandarin term *shangye hangtian*, which literally translates as "commercial space," functions as a false friend and in fact would be more appropriate to be translated as a New Space dynamic within the PRC, rendering the use of the term "Chinese commercial space" misleading. This hypothesis is reinforced by the frequent comparisons drawn by Chinese authors with developments in the United States. While both the timing in the mid-2010s and the nature of the phenomenon, in particular the emergence of private actors in the upstream segment of space activities, the expression "New Space" [新空间 *xin kongjian*]

has almost never been observed in the Chinese sources consulted in this research to describe this phenomenon in China[8].

In common usage in China, the term *commercial space* is generally contrasted with what is referred to as *traditional space* [传统航天 *chuantong hangtian*], characterized by the predominance of institutional programs with no immediate economic objectives, such as scientific missions, deep space exploration programs, or defense-related activities. These programs are typically part of long-term planning, publicly funded, and coordinated at the highest levels of the state apparatus. While their internal functioning is difficult to document, several academic publications and specialized reports have attempted to analyze them.

On the industrial side, *traditional space* or *national team* [国家队 *guojia dui*], refer to two major state-owned conglomerates: the China Aerospace Science and Technology Corporation (CASC) and the China Aerospace Science and Industry Corporation (CASIC). Each of these entities employs over 100,000 people (CASC reported approximately 170,000 employees in 2020; CASIC, around 150,000) and is subdivided into specialized academies that function as semi-autonomous units. For example, the Shanghai Academy of Spaceflight Technology (SAST)—also known as the Eighth Academy of CASC—is responsible for several launcher models, while the Fourth Academy of CASIC (China Aerospace Sanjiang Group) develops the Kuaizhou launchers.

A distinction between the two groups was summed up during a field interview in the form of a dark humor pun: *"CASC transports people, CASIC brings them disasters"* [航天科技是载人，航天科工是灾人 *hangtian keji shi zai ren, hangtian kegong shi zai ren*], highlighting the more military-oriented nature of CASIC's activities. This impression is reinforced by the fact that the Kuaizhou launchers are based on solid-propellant ballistic missile technology, although the exact models have not been officially confirmed. Another interviewee described the relationship between CASC and CASIC as a division in name only: *"one structure, two labels"* [一个机构两个牌子 *yige jigou liangge paizi*], suggesting that these companies—originally intended to operate in competition—have in practice divided their roles within the national space sector. CASC nonetheless appears to be the dominant group, with a much broader

[8] To be precise, the term "New Space" in Mandarin has only appeared in a single source: a specialized article referring to the situation in the US which was co-authored by an American scholar. Adrienne Harebottle and Yongyan Shen, "2020: a Turning Point for Chinese commercial Space [2020 nian: zhongguo shangye hangtian de zhuanzhe dian] 2020 年：中国商业航天的转折点," *Satellite and Network*, no. 08 (2020): 34–36.

portfolio of activities, including crewed spaceflight, Earth observation satellites, heavy-lift launchers (Long March 5, 6, 7), the Tiangong space station, and the Chang'e lunar missions.

A disctinction should also be made here in terms of chronological limits for the topic. We address a phenomenon identified initially as having started in the 2010s, designated as *commercial space*, and do not refer to for profit commercial space activities in the launch sector in the 1980s, which will be referred to as *commercialization*, as presented in the following box:

The use of the term *commercialization* in association with Chinese space launch activities first appeared in the 1980s to refer to the entry of Long March launch services onto the international market. The China Great Wall Industry Corporation (CGWIC) was established in 1980 as a body responsible for marketing Chinese launch services and satellites to foreign clients. This wave of commercialization led to the launch of a number of satellites, including those from American customers. However, the phenomenon came to an abrupt end in the 2000s, with the introduction of satellite and space technology export control restrictions—known as ITAR (International Traffic in Arms Regulations)—which effectively barred China from the U.S. satellite launch market, as well as from launching satellites that included U.S.-origin components[9].

In this dissertation, satellite launches carried out via Long March rockets through CGWIC for foreign clients will be referred to exclusively as *space commercialization*. While this represented a significant departure from the planned economy and strategic weapons orientation of the previous era[10], the actors involved in space commercialization remained entirely state-owned enterprises, which created spin-offs specifically for the purpose of marketing technologies they had developed[11].

The phenomenon examined in this dissertation—*commercial space*—is described as *new* in English-language sources, with its emergence dated to the mid-2010s, marked by the rise of new actors, including companies referred to as "private" or, at the very least, "nominally private." These chronological boundaries are critically discussed in Chapter V.

This distinction between *commercialization* and *commercial space* is based on the work of Liu Yufei, discussed in Chapter II of this dissertation. The relationship between space

[9] Nathaniel Rome, "China's Space Export Strategy," *Space Policy* 66 (November 1, 2023): 101574, https://doi.org/10.1016/j.spacepol.2023.101574. p.3

[10] See Evan A. Feigenbaum, *China's Techno-Warriors: National Security and Strategic Competition from the Nuclear to the Information Age* (Stanford University Press, 2003)., Chapter 3 "Changing course, 1975-1986", p.71-115.

[11] For more information about this phenomenon, see E. Feigenbaum, op. cit. p.194-198.

commercialization and commercial space is a promising avenue for future research. For instance, during field interviews, a former employee from the state sector, working at the time at an insurance broker company specialized in Space, remarked: "*It was the failure of space commercialization that gave rise to commercial space.*" (Chapter VII, exchange no 21) Sheehan also draws a direct link between the implementation of export controls and the Chinese government's investment in application-driven technologies to meet growing demand for space-based infrastructure and services[12]. As we will see in Chapter V, the content of the white papers may not prove such a causal relationship, but they do suggest a coherent timeline.

Structure of the Dissertation

The title of this dissertation — *Commercial Space in China: Policies, Market and Discourses in the Launch Sector* — reflects both the object of study and its structure.

Part 1 is devoted to examining how commercial space is defined in the Chinese specialized literature, the following sections focus more narrowly on the launch sector. Chapter I outlines the research strategy adopted to study commercial space in specialized and academic literature in mandarin. It presents methodological tools for navigating the academic database CNKI (China National Knowledge Infrastrcuture). Chapter II offers a critical analysis of a sample of productions on the topic, situating the research topic within its discursive field and presenting its framing by various authors.

Part 2, presents an analysis of regulatory texts relevant to commercial space activities in order to assess how the sector's development is framed within broader political and institutional discourses. Chapter III is dedicated to the presentation and study of a selection of regulatory and other policy texts gathered by Future Aerospace Research Institute. Chapter IV analyses the relevant dispositions of the successive White Paper on Chinese Space activities

Part 3, Chapter V offers a market assessment of China's commercial launch sector, grounded in both supply- and demand-side data, and explores the positioning of key actors within this evolving ecosystem, distinguishing between *minying* enterprises, spin off to State-owned enterprises, and mixed ownership enterprise supported by the Chinese Academy of Sciences (CAS)

[12] Michael Sheehan, "'Did You See That, Grandpa Mao?' The Prestige and Propaganda Rationales of the Chinese Space Program," *Space Policy*, Special Issue: China's Rising Star, Japan's Re-entry: East Asia's Space Security in a Global Context, 29, no. 2 (May 1, 2013): 107–12, https://doi.org/10.1016/j.spacepol.2013.03.003. p.57

Part 4 presents an analysis of financial data for a selection of the main commercial space launch enterprises. Chapter VI includes an analysis of shareholding structures and their evolution between 2020 and 2023, and a presentation of their territorial implantation via wholly owned subsidiaries.

Part 5, *Discourses*, identifies and analyzes the narratives put forward by stakeholders themselves. Chapter VII is based on 30 field interviews, Chapter VIII on a six-month study of the social media publications of leading commercial launch companies.

Theoretical Framework and Research Methods

The theoretical framework mobilized in this research is transdisciplinary. It draws on several disciplinary fields within the humanities and social sciences, reflecting my academic background — particularly in Science and Technology Studies (STS), legal and political studies, and Chinese studies. The methodology combines the collection of relevant primary and secondary sources in Mandarin; qualitative and discursive analysis; quantitative analysis; and fieldwork.

Detailed methodology will be provided in the text of the chapter for the selection and methodology of each sources, which include: specialized articles in mandarin on the topic of commercial space; regulatory texts relevant for commercial launch activities; quantitative data pertaining to the capitalistic structure of a selection of 12 commercial launch enterprises; field interviews; a six-month monitoring of the official WeChat account of the selected commercial launch enterprises.

These research places particular emphasis to rigor in the treatment of documentary sources from the PRC and on the reproducibility of the research methods, in particular through the identification and use of relevant and publicly accessible databases, in particular China National Space Infrastructure (CNKI), Aiqicha and WeChat, respectively presented in Chapter I; Chapter VI and Chapter VIII. This concern, particularly present at the beginning of the research, was nevertheless increasingly challenged by growing difficulties in accessing information platforms, notably CNKI and AiqiCha

The deliberate choice to focus exclusively on Chinese sources stems from a desire to understand the topic from the perspective of local stakeholders. Given the challenges associated with accessing such sources —including language barriers, methodological difficulties, and more recent online geographical restrictions— as well as the sheer abundance of material once these barriers are overcome, this approach was considered the most likely to provide a valuable contribution to the literature. The goal is not only to analyze these sources, but also to document

and explain how such research can be conducted, for the benefit of others working on similar topics.

As a result, this dissertation does not engage in depth with the broader English- and French-language literature on Chinese space activities more generally — such as the work of Isabelle Sourbès-Verger, Marco Aliberti, Joan Johnson-Freese or Brian Harvey[13]. Instead, the literature review presented below focuses specifically on English-language scholarship dealing with commercial space in China, particularly a series of dedicated reports published in the early 2020s.

Commercial Space in English Language Literature

In this introduction, an overview of this body of literature, which serves as the starting point of my research is provided. We examine the types of studies it comprises, the areas of consensus, and the recurring questions and debates. The epistemological challenges posed by these works are also highlighted. This critique is contextualized within a broader corpus of authors who have criticized the treatment of Chinese space activities in English-language literature. A preliminary clarification of key terms related to China's commercial space sector is provided, followed by an explanation of how my research positions itself within the existing literature and the contributions it seeks to make.

This literature review does not constitute a standalone chapter for several reasons. First, as Han et al. have pointed out, commercial space has received limited academic attention *per se*, resulting in a relatively small body of available scholarly literature[14]. Finally, the institutional affiliations of certain authors and their research methodologies raise precisely the epistemological concerns discussed below. Second, the fundamental approach of this research has been to rely on Chinese sources while making my access to these materials as explicit and reproductible as possible. This is intended to address a challenge identified by several authors and presented below, namely, the difficulty of accessing sources notably due to language barriers, and to facilitate the work of other researchers on the topic.

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[13] Isabelle Sourbès-Verger and Denis Borel, *Un Empire Très Céleste - La Chine à La Conquête de l'espace*, Dunod, 2008; Marco Aliberti, *When China Goes to the Moon...*, Studies in Space Policy (Springer International Publishing, 2015), https://www.springer.com/gp/book/9783319194721; Brian Harvey, *China in Space: The Great Leap Forward*, 2nd ed., Space Exploration (Springer International Publishing, 2019), https://www.springer.com/gp/book/9783030195878.;Joan Johnson-Freese, *The Chinese Space Program: A Mystery Within a Maze* (Krieger Pub., 1998).

[14] Yuexia Han et al., "A PIE Analysis of China's Commercial Space Development," *Humanities and Social Sciences Communications* 10, no. 1 (October 28, 2023): 1–11, https://doi.org/10.1057/s41599-023-02274-w. p.2

Commercial space, a Growing Issue in English Language Sources

At the outset of this research in the early 2020s, the topic of 'Chinese commercial space' was emerging and gaining traction across a variety of English-language sources[15]. The global spotlight on Chinese space activities had intensified, driven by a series of high-profile achievements in its national space program. These included the successful Chang'e 4 lunar missions, culminating in sample returns from the far side of the Moon in January 2019, and the Zhurong rover's exploration of Mars in May 2021 in the frame of the Tianwen interplanteray exploration program. Human spaceflight also advanced with the Shenzhou program, which laid the groundwork for the construction and operation of the Tiangong space station, completed in 2022. Meanwhile, the country officially completed its own global navigation system, Beidou in July 2020 and significantly expanded its Earth observation and communication satellite constellations.

On the commercial front, as Zhang and Tsang put it, "*China is now being perceived as a potential game changer. Established state firms China Aerospace Science and Technology Corporation (CASC) and China Aerospace Science and Industry Corporation (CASIC) are listed in the Fortune Global 500 list, whereas start-ups such as Zhuhai Orbita Aerospace and LinkSure Network have grown since the 2010s.*"[16]

Han Yuexia et. al formulate it in the following fashion: *"The Chinese commercial space sector seems to be catching up with its Western counterpart partially as a result of policy support and capital involvement. Many emerging companies such as iSpace and Commsat have rapidly developed particularly since 2015."*[17]

The commercial launch sector also stood out as one of the most visible aspects of China's emerging commercial space industry, garnering significant media traction. The first attempts at orbital launch, LandSpace and OneSpace suffered failures, respectively in October 2018 and March 2019. Beijing Interstellar Glory, alias iSpace, was the first to put a satellite in orbit on July 25, 2019, and made three other unsuccessful attempts on February 1st and August 3rd 2021,

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[15] Middle format publications include : V. Neel Patel, « China's Surging Private Space Industry Is out to Challenge the US », *MIT Technology Review* (blog), 21 January 2021, https://www.technologyreview.com/2021/01/21/1016513/china-private-commercial-space-industry-dominance/; R. Lincoln Hines, « Can China's Commercial Space Sector Achieve Lift off? », *East Asia Forum* (blog), 5 May 2021, https://www.eastasiaforum.org/2021/05/05/can-chinas-commercial-space-sector-achieve-lift-off/; Blaine Interview of Curcio, « Developments in China's Commercial Space Sector » (National Bureau of Asian Research, 24 August 2021), https://www.nbr.org/publication/developments-in-chinas-commercial-space-sector/; Jason Szeftel, « The Space Review: Red Heaven: China sets its sights on the stars (part 2) », *The Space Review* (blog), 21 March 2022, https://www.thespacereview.com/article/4352/1.

[16] Zhang and Tsang, "Knowledge and Innovation Within Chinese Firms in the Space Sector." p.2906

[17] Han et al., "A PIE Analysis of China's Commercial Space Development."p.2

May 13th 2022. December 7th 2020 saw the second successful launch for such an enterprise, Galactic Energy.

Among the long-format publications dedicated to commercial space in China, a notable set of reports has been produced by various institutions. One of the most widely cited is the 2019 report *Evaluation of China's Commercial Space Sector*, authored by Irina Liu, Evan Linck, Bhavya Lal, Keith Crane, Xueying Han, and Thomas Colvin for the Science & Technology Policy Institute of the Institute for Defense Analyses[18]. This report is considered a landmark in the specialized literature on the topic. It provides a review of the current landscape of China's nascent but growing commercial space sector, outlines a policy framework, distinguishes between different types of commercial space enterprises through a typology, and discusses their characteristics. The report also offers an assessment of the sector's strengths, weaknesses, and potential future developments.

The China Aerospace Studies Institute (CASI), affiliated with the U.S. Air Force, focuses on the study of China's aerospace forces and related civilian-military dynamics. It has published two reports particularly relevant to the study of commercial space in the PRC. The first, *China 'Private' Defense Enterprises*, authored by Andrew Hull and David Markov with Eric Griffin, was published in 2020[19]. It offers a risk assessment of a selection of Chinese commercial space enterprises, based on an evaluation of their proximity to the People's Liberation Army (PLA). The second, *China's Space Narrative*, authored by Kevin Pollpeter, Timothy Ditter, Anthony Miller, and Brian Waidelich, includes a Chapter 4 titled *Making China Rich: China's Views on Commercial Space and Space Natural Resource Extraction*[20]. This chapter examines the rationale for commercial space in China, outlines existing policies and regulations, provides elements of a market evaluation, and discusses some of the challenges faced by the sector.

Another report was published in 2021 by the Secure World Foundation and the Caelus Foundation, authored by Walsh, Christensen, and Ronci. Based on a literature review and interviews conducted in both the United States and China, the report identifies a number of "gaps" between the perceptions held by U.S. space industry stakeholders regarding commercial space in the PRC and the authors' own assessment of the sector in China.

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[18] Irina Liu et al., "Evaluation of China's Commercial Space Sector."
[19] Andrew W Hull, David R Markov, and Eric Griffin, "'Private' Chinese Aerospace Defense Companies" (China Aerospace Study Institute (CASI), June 2020), https://www.airuniversity.af.edu/Portals/10/CASI/Books/CASI_Chinese_Aerospace_Defense_Companies.pdf.
[20] Kevin Pollpeter et al., "China's Space Narrative - Examining the Portrayal of the Us-China Space Relationship in Chinese Sources and Its Implications for the United States" (China Aerospace Studies Institute, September 10, 2020).

These four reports constitute the foundation of the argumentation of this introduction.

It is also important to mention that industry reports by the consulting firm Euroconsult (now Novaspace) were published at least in 2018 and 2020. These include *China Space Industry 2018: A Guide to the Rapidly Evolving Landscape in China's Private and Public Space Industry*[21], and *China Space Industry 2020 edition: A Deep-Dive Analysis of the Current Chinese Space Ecosystem and Future Expected Evolutions*[22]. Although these reports have been influential—the 2019 IDA report by Liu et al. makes several references to the 2018 edition, while the 2021 Walsh et al. report cites the 2020 edition—they are not publicly available and are placed behind a paywall of several thousand euros, making them inaccessible for the purposes of this research. These industry reports also frequently mention BryceTech (formerly Bryce Space and Technology)[23], a U.S.-based analytics and engineering firm that provides data-driven insights on space and satellite markets, as well as Space Angels[24], a U.S. venture capital company that invests in the space industry and monitors global space investment trends.

Blaine Curcio, founder of Orbital Gateway Consulting, a Hong Kong–based consulting firm and Euroconsult partner, also stands out as a key point of reference on Chinese space industy. Curcio regularly contributes to specialized journals and public events on the Chinese space sector, and edits a regular Newsletter on Chinese space activities titled China Space Monitor[25].

Some academic articles can be noted, notably Yuan and Peeters[26], Zhang et Tsang[27], Han et. al[28], Nie Mingyan[29], Zhang and Yang[30].

Finally, it is important to acknowledge the work of authors and analysts producing content in shorter or alternative formats, conducting valuable work in providing accessible insights into commercial space activities in China. Andrew Jones, a reporter for SpaceNews, regularly

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[21] "China Space Industry 2018: A Guide to the Rapidly Evolving Landscape in China's Private and Public Space Industry" (Euroconsult, 2018).
[22] Euroconsult, "China Space Industry 2020 Edition - A Deep-Dive Analysis of the Current Chinese Space Ecosystem and Future Expected Evolutions," May 2020.
[23] "BryceTech," accessed April 2, 2025, https://brycetech.com.
[24] "Space Angels," accessed April 2, 2025, https://www.spaceangels.com.
[25] "The China Space Monitor - About," accessed April 2, 2025, https://chinaspacemonitor.substack.com/about.
[26] Yuan Yuan and W. Peeters, "Research Viewpoint: Rapid Growth of the Chinese Commercial Space Sector," *Astropolitics* 17, no. 3 (September 2, 2019): 191–207, https://doi.org/10.1080/14777622.2019.1675430.
[27] Zhang and Tsang, "Knowledge and Innovation Within Chinese Firms in the Space Sector."
[28] Han et al., "A PIE Analysis of China's Commercial Space Development."
[29] Mingyan Nie, "Space Privatization in China's National Strategy of Military-Civilian Integration: An Appraisal of Critical Legal Challenges," *Space Policy* 52 (May 1, 2020): 101372, https://doi.org/10.1016/j.spacepol.2020.101372.
[30] Max Zhang and Xiaonan Yang, "China's Emerging Commercial Space Industry: Current Developments, Legislative Challenges, and Regulatory Solutions," *Acta Astronautica* 202 (January 1, 2023): 9–16, https://doi.org/10.1016/j.actaastro.2022.10.011.

covers a wide range of Chinese space activities, including developments in the commercial sector[31].

Jean Deville, creator of the YouTube channel DongFangHour[32] and the (now closed) *China Aerospace Blog*, regularly produces explanatory videos covering various aspects of China's space activities, both institutional and commercial and has been associated to a number of consulting and expert reports, as well as co-authored an academic article in French on workforce and brain drain issues in the state-run and commercial space sectors[33].

Given that my research focuses primarily on Chinese sources, and the sheer volume of material they produce is substantial, the choice was made not to systematically explore these other formats, which nonetheless represent promising avenues for future research, particularly if treated as a corpus to be gradually compiled and structured in a manner akin to an archive.

Consensual Views

Figures of a Growing Sector

English-language publications from the early 2020s generally described the sector as experiencing growth, sometimes in highly enthusiastic terms[34], characterized by a proliferation of new company formations and funding rounds. Yet, the methodologies used for these counts often vary—and are rarely explained in detail by the authors—raising several issues discussed in this subsection. The circulation of numerical estimates frequently relies on the replication of graphs from one publication to another, as illustrated by the following diagram, originally published on the *China Aerospace Blog*. According to this source, the number of commercial space startups in China was estimated at 55 in April 2019 and had risen to 87 by June of the same year[35].

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[31] "Space News - Andrew Jones," SpaceNews, April 1, 2025, https://spacenews.com/author/andrew/.
[32] "Dongfang Hour - YouTube," accessed April 2, 2025, https://www.youtube.com/.
[33] Jean Deville and Guillaume Thibault, "Will there be a war for talents? Overview of human stakes in the rise of Chinese space sector[La guerre des talents aura-t-elle lieu ? Panorama des enjeux humains dans l'essor du spatial chinois]," *Monde Chinois*, no. 64 (October 2020): 90–105.
[34] Hongpei Zhang, « China's commercial space sector picking up momentum, firms' financing expected to double in 2022: report - Global Times », 19 April 2022, Global Times, https://www.globaltimes.cn/page/202204/1259744.shtml, Andrew Jones, « Chinese Space Launch Startups Attract a Frenzy of Investment », *SpaceNews* (blog), 10 February 2022, https://spacenews.com/chinese-space-launch-startups-attract-a-frenzy-of-investment/.
[35] "A Large Scale Update of the China Aerospace Blog NewSpace Mapping (June 2019 Edition)," *The China Aerospace Blog* (blog), June 10, 2019, https://china-aerospace.blog/2019/06/10/a-large-scale-update-of-the-china-newspace-mapping-06-2019/.

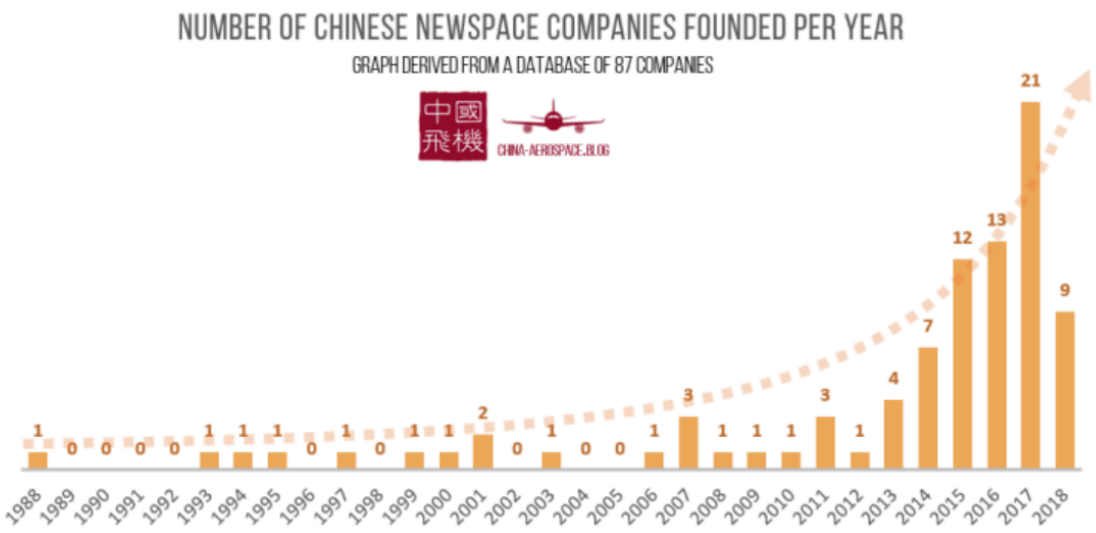


Fig. 3 – Dynamics of NewSpace startup creations year by year

Yet in 2019, the above-mentioned report of Liu et al. for the IDA identified 78 commercial space companies in China "*active in the satellite manufacturing, launch, remote sensing, communications, data analytics and ground systems segments of the space industry*".

In 2023, Han et al. found that *« In about seven years, more than three hundred commercial space corporate entities were established and leading companies gradually emerged, which somehow bears some resemblance to the commercial space developmental trajectory in the West. »*[36]

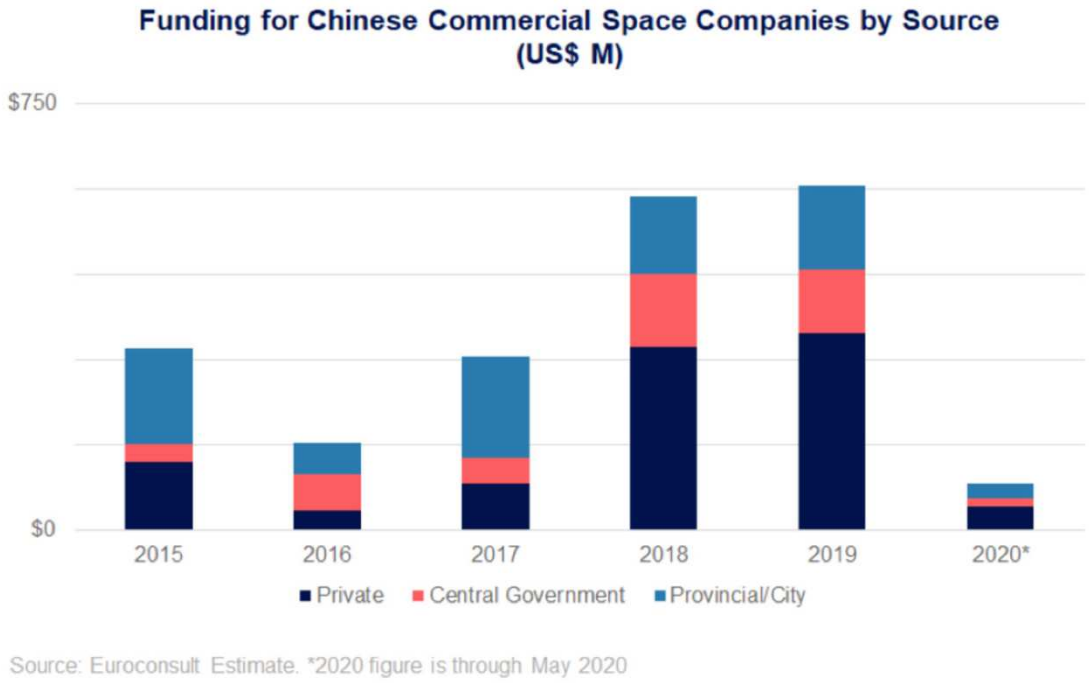
Concerning the launch sector in particular, in August 2021 Blaine Curcio evaluated the number of enterprises engaged in the manufacture of space launchers and subpart alone at around 25[37].

Regarding funding rounds, the report of Liu and al. in 2019 provides: *"Our best count of investment in the commercial space sector is between about $600–900 million in the years 2014–2018*"[38]

An excerpt from Euroconsult 2020 *China Space Industry Reports* made available, that also circulated among other production finds: *"The Chinese government began to liberalize private investment into the space sector in 2014, and since then more than US$900 million in private funding has been invested. With nearly equal investment from government sources,*

[36] Han et al., "A PIE Analysis of China's Commercial Space Development." p.2
[37] "Developments in China's Commercial Space Sector - Interview of Blaine Curcio."
[38] Irina Liu et al., "Evaluation of China's Commercial Space Sector." p.vi

commercial companies have raised a total of at least US$1.85 billion since 2014."[39] The same excerpt includes a graph showing the evolution of investment between 2015 and 2020, as well as its breakdown between private and government sources.



The 2021 report by Walsh et al. drew on data from other specialized consulting reports: *"U.S.-based space consulting firm Bryce Space and Technology reports that $314.2 million was invested "into Chinese [space] ventures during 2019, up from $288 million in 2018". while Chinese satellite manufacturers raised close to $155 million in 2020*[40]*. […] Euroconsult reported that Chinese commercial launch companies raised a total of a total of approximately $530 million across 8 funding rounds in 2020 and the last 2 months of 2019; while Chinese satellite manufacturers raised close to $155 million in 2020.*[41] "[42]

[39] "Private Investment Fuels China Commercial Space Sector Growth, alongside State-Backed Investment," June 4, 2020, https://www.euroconsult-ec.com/press-release/private-investment-fuels-china-commercial-space-sector-growth-alongside-state-backed-investment/.
[40] Quoting "Start-up Space 2020" (Bryce Space and Technology, March 9, 2020), https://brycetech.com/reports/report-documents/Bryce_.
[41] Quoting "Constellation Watch: China's Incubating Answer to Starlink | Satellite Markets & Research," accessed March 22, 2025, https://satellitemarkets.com/constellation-watch-china-incubating-answer-starlink; Blaine Curcio, "#SpaceWatchGL Opinion: Launching Into the New Decade," *SpaceWatch.Global* (blog), November 29, 2020, https://spacewatch.global/2020/11/spacewatchgl-opinion-launching-into-the-new-decade/.
[42] Kathryn Walsh, Christensen, and Ronci, "Lost Without Translation." p.7

For the launch sector in particular, iSpace and Landspace announced to have raised over 170 million USD each in autumn 2020[43]. Galactic Energy would have raised over 200 million USD through two funding rounds in the second half of 2021[44]. Established in 2020, OrienSpace would have raised nearly 50 million USD in May 2022, while Deep Blue Aerospace 31 million USD in January the same year[45].

The omnipresence of such figures in short, medium and long format publications provides an opportunity to raise an epistemological issue concerning the production of knowledge in English-language literature on commercial space sector in the PRC via consulting reports, detailed in the following box.

As part of preliminary research, two consultants specialized in the space sector were interviewed, one American and the other French, working for different companies. Both confirmed using similar methodologies when producing quantitative evaluations included in their work reports. They revealed that these are generally informed estimates, based on internal databases and interviews conducted with professional contacts from within their own networks or those of their companies. When contacted to inquire about the methodology used to calculate the share of Chinese investment in a global assessment, a third consulting firm replied that it could not disclose its method, as it was considered "proprietary".

While the charts and figures presented in reports may give the impression of definitive results—especially since these visuals tend to circulate—they generally do not provide a clear methodology for how they were produced, relying instead on informed estimates. This epistemological issue is tied to the very nature of these reports, particularly consulting reports, which aim to be persuasive, are intended for industrial stakeholders seeking clear and concise answers, and are not subject to peer review. This sets them apart from scientific articles—less common on the subject—such as those by Han et al. or Zhang and Tsang, which explicitly lay out their methodological framework and the processes used to acquire and organize their data.

One of the aims of this dissertation is to explain as clearly as possible the sources used, the limitations they entail, and the methods of calculation—especially in the quantitative research

[43] Andrew Jones, "Chinese Space Launch Firm iSpace Raises $173 Million in Series B Funding," *SpaceNews* (blog), August 25, 2020, https://spacenews.com/chinese-space-launch-firm-ispace-raises-173-million-in-series-b-funding/; Andrew Jones, "China's Landspace Raises $175 Million for Zhuque-2 Launch Vehicles," *SpaceNews* (blog), September 9, 2020, https://spacenews.com/chinas-landspace-raises-175-million-for-zhuque-2-launch-vehicles/.

[44] Andrew Jones, "China's Galactic Energy Raises $200 Million for Reusable Launch Vehicle Development," *SpaceNews* (blog), January 24, 2022, https://spacenews.com/chinas-galactic-energy-raises-200-million-for-reusable-launch-vehicle-development/.

[45] Andrew Jones, « Chinese Launch Startup OrienSpace Raises $59.9 Million in Series A Round », SpaceNews, 20 May 2022, https://spacenews.com/chinese-launch-startup-OrienSpace-raises-59-9-million-in-series-a-round/.

conducted on the ownership structures of launch vehicle companies in Chapter VI of this dissertation.

Particularly noteworthy in this regard is a criticism found in the chapter dedicated to 'Chinese commercial space' of the CASI report on 'China's Space Narrative', aimed at a growth estimate produced by a Chinese company providing consulting services, FutureSpace (referred to as "FutureAerospace" here):

"Chinese analysts assess China's commercial space market to be small, but expect quick growth. According to Futureaerospace, in 2018 Chinese commercial space investment and financing had a total value of about $520 million (3.6 billion CNY). By 2025, the think tank expects the value of the domestic commercial space market to surpass $4.4 billion (13.6 billion CNY in the commercial satellite manufacturing industry and 17 billion CNY in the commercial satellite launch market).

Considering the small size of the commercial space sector in China and its limited technological level, Futureaerospace's projected growth of China's commercial space market may be overly optimistic. The think tank foresees the domestic market's growth as being fueled by a major uptick in satellite launch, arguing that China may launch as many as 3,100 commercial satellites by 2025. Reaching this figure, however, would mean that China will need to launch more than 500 satellites annually—more than any other country has ever launched on an annual basis. In 2019, for example, the global combined total for satellites launched into orbit was 516. As of September 2019, China had only 323 operational satellites, 56 of which are commercial. In 2018, it launched just 25 commercial satellites. Furthermore, in July 2019 a China National Space Administration (CNSA) official said that China would launch "nearly 100" satellites by 2025—far short of the thousands of satellites imagined by Futureaerospace."[46]

The passage above criticizes an overly enthusiastic assessment of the growth prospects for space-related investments in China in a local report. Such criticism can be explained by the very position of consulting firms in general, which generate revenue through the sale of industry reports. By forecasting a market on the verge of a major turning point, they might also in some instances seek to maintain ongoing interest from their clients. This particular position of a

[46] Pollpeter et al., "China's Space Narrative - Examining the Portrayal of the Us-China Space Relationship in Chinese Sources and Its Implications for the United States." p.34, quoting Pinhe Cultural Investment (Pinhe Wentou; 拼合文投). "Futureaerospace Releases 'Investment in China's Aerospace Sector 2018'." (*Weilai Yuhang Yanjiuyuan Fabu "2018 Zhongguo Shangye Hangtian Chanye Touzi Baogao*; 未来宇航研究院发布 <<2018 中国商业航天产业投资报告>>). May 17, 2019. www.pinhemedia. com/news/300.html.

significant portion of the English-language literature therefore raises an epistemological issue—especially in the absence of transparency regarding the methodologies used in these calculations.

The Role of a Certain 'Document 60'

Another widely shared theme in the English-language literature on commercial space is the emphasis on policy changes around the mid-2010s, especially a document frequently referred to as "Document 60". This turn of phrase has become something of a *cliché* in shorter formats, though it also features in more academic publications[47].

Interestingly, the study by Han et al. identifies the issuance of the *Medium and Long-Term Development Plan for National Civilian Space Infrastructure (2015–2025)* as the starting point for commercial space development in China[48]. While this document is listed in FutureSpace's compilation presented in Chapter III, it is not commonly mentioned by the interviewees in Chapter VII. This original choice underscores the fact that establishing a direct and automatic correlation between the publication of the *2014 Guiding Opinion* and the emergence of a commercial space sector in China is neither self-evident nor universally accepted.

The IDA report places the role of the 2014 *Guiding Opinion* more cautiously within a broader policy context and list several other relevant documents[49].

"*Many Chinese space industry watchers credit Document 60 for officially opening up the space industry to private investment and actively encouraging participation of private companies in a historically state-dominated industry. Although Document 60 is the first policy document issued by the Chinese government explicitly encouraging private individuals and companies to conduct space activities, the actual impact of Document 60 may not be particularly large. It only opens up the remote sensing and launch sectors, and does not open up historically more profitable sectors such as satellite communications. Many company representatives with whom we spoke said that they were either unaware of or did not pay attention to Document 60 when their companies were established. Some Chinese space policy and law experts were also unaware (or professed lack of awareness) of Document 60 at the time of our interviews*."

The *China Aerospace Defense Companies* report of CASI does not make mention of a "Document 60" but uses the full title of the text, in a fashion similar to the chapter dedicated to

[47] R. Lincoln Hines, "Heavenly Mandate: Public Opinion and China's Space Activities," *Space Policy*, January 15, 2022, 101460, https://doi.org/10.1016/j.spacepol.2021.101460. p.2
[48] Han et al., "A PIE Analysis of China's Commercial Space Development."
[49] Irina Liu et al., "Evaluation of China's Commercial Space Sector." pp.11-20

commercial space of the *China Space Narrative* report, which also mentions several other influencial policies[50]. The analytical framework of Hull et al. report, like the one of Pollpeter et al. both make "Chinese commercial space" fall primarily under Civil Military Integration (CMI).[51]

In this dissertation, I avoided the label "Document 60" to refer to the *Guiding Opinions of the State Council on Innovating the Investment and Financing Mechanisms in Key Areas and Encouraging Social Investment*, opting instead for the term 2014 *Guiding Opinion*. The expression "Document 60" can indeed be misleading. First, it is not an unidentified "document" but *guiding opinions* [指导意见 *zhidao yijian*], an established category within the normative hierarchy of the People's Republic of China. Moreover, the term "document" may convey a sense of secrecy or restricted access, whereas the text is publicly available. Finally, the 2014 *Guiding Opinions* are better understood as part of a broader and contested policy corpus, rather than as a singular, all-encompassing directive.

Uncertainties Regarding the Nature of Commercial Space

The authors of the reports discussed in this introduction all raise the issue of the difficulty to define the term *commercial space* in the context of the PRC, a broader concern within the literature[52]. This question is addressed in the first part of this dissertation, particularly in Chapter II, from the point of view of Chinese sources. However, it is necessary at this point to offer a clarification, especially of a historical nature, regarding the scope of the subject of this dissertation.

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[50] Pollpeter et al., "China's Space Narrative - Examining the Portrayal of the Us-China Space Relationship in Chinese Sources and Its Implications for the United States." pp.32-33

[51] Hull, Markov, and Griffin, "'Private' Chinese Aerospace Defense Companies," June 2020. p.5

[52] I. Liu and al., Evaluation of China's commercial space sector, Institute for de- fense analyses science & technology policy Institute, September 2019 https:// www.ida.org/-/media/feature/publications/e/ev/evaluation-of-chinas- commercial-space-sector/d-10873.ashx, pp.2e6; J. Deville, A Large Scale Up- date of the China Aerospace Blog NewSpace Mapping (June 2019 Edition), The China Aerospace Blog, 10 June 2019, https://china-aerospace.blog/2019/06/ 10/a-large-scale-update-of-the-china-newspace-mapping-06-2019/; Euro-consult, China Space Industry 2020 edition - A deep-dive analysis of the current Chinese space ecosystem and future expected evolutions, May 2020; L. Laskai, Building China's SpaceX: Military-Civil Fusion and the Future of China's Space Industry Testimony before the U.S.-China Economic and Secu- rity Review Commission (2019), https://www.uscc.gov/sites/default/files/ Lorand%20Laskai%20USCC%2025%20April.pdf, pp. 5e7; China's Ambitions in Space: Contesting the Final Frontier, in 2019 Report to Congress, U.S.-China Economic and Security Review Commission, 2019, https://www.uscc.gov/ sites/default/files/2019-11/Chapter%204%20Section%203%20-%20China%E2% 80%99s%20Ambitions%20in%20Space%20-%20Contesting%20the%20Final% 20Frontier.pdf, pp.375e377; M. Stokes and al., China's Space and Counter- space Capabilities and Activities, U.S.-China Economic and Security Review Commission, 30 March 2020, https://www.uscc.gov/sites/default/files/2020-05/China_Space_and_Counterspace_Activities.pdf, p.74-80.

In the *China Aerospace Defense Companies* report, this issue takes the form of a warning note, echoing the doubts expressed earlier by individuals interviewed by Walsh et al. within the U.S. space industry[53]:"*The terms 'private' and 'commercial' are used here in the most generic sense in that they are not wholly owned by the Chinese state, CCP, or PLA. Although these terms have specific meanings and connotations to an American audience, it is important to realize that companies operating within the PRC are never truly independent from the Communist Party, even private firms must have a CCP Party Committee. Additionally, the Military-Civil Fusion program and associated laws mandate that private or commercial firms turn over any and all requested material or technology to the state upon request.*"[54]

In fact, this definitional difficulty also applies to the term *commercial space* in English, as highlighted by Han et al., Walsh et al. as well as Pollpeter et al.[55] The concept of commercial space lacks a universally accepted definition among English-language authors, even when referring to the U.S. context. *"Commercial space can be difficult to define. Some definitions limit commercial space activities to those performed by a 'private sector entity [that] puts its own capital at risk and provides goods or services primarily to other private sector entities or consumers rather than to the government.' Other definitions include 'sales of consumer equipment by companies even though the satellite system is owned by the government' and private companies offering products and services to government clients as commercial space activities.*"[56]

It is also worth noting that the reports examined tend to portray the Chinese situation as exceptional, emphasizing the distinctiveness of the national context—particularly in terms of private sector independence, enterprise ownership, and the political influence exerted over Chinese companies. In contrast, some Chinese authors tend to stress the importance of American influence in the emergence of commercial space in China, particularly that of Elon Musk. They also highlight the close ties between the public and private sectors in the United States, which is often regarded as a model.

Returning to the conceptual framework used by critics of the English-language literature on China's space activities, this could be seen as another facet of the *otherization* performed in American analytical discourse. These narratives tend to frame the Chinese context as

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[53] Kathryn Walsh, Christensen, and Ronci, "Lost Without Translation." p.15 and 22, see above p.1
[54] Hull, Markov, and Griffin, "'Private' Chinese Aerospace Defense Companies," June 2020.p.4
[55] Han et al., "A PIE Analysis of China's Commercial Space Development." p.6, Kathryn Walsh, Christensen, and Ronci, "Lost Without Translation"; Pollpeter et al., "China's Space Narrative - Examining the Portrayal of the Us-China Space Relationship in Chinese Sources and Its Implications for the United States."
[56] Pollpeter et al., "China's Space Narrative - Examining the Portrayal of the Us-China Space Relationship in Chinese Sources and Its Implications for the United States." p.30

exceptional, while overlooking the international—originally American—dimension of the entrance of private actors into the space sector, captured by the term *New Space*, of which China's commercial space sector may also be viewed as a local variation.

It should be noted here that this dissertation does not offer a specific analysis of the Chinese Communist Party as a distinct actor, insofar as its explicit presence appeared only marginally in the materials studied.

Neither the specialized literature in Mandarin, nor the primary regulatory sources, nor the field interviews made direct reference to the Party as such. The institutions examined in Part 2 of this dissertation, which focuses on the political and regulatory framework of commercial space activities in China, are officially state bodies but operate within a structure that is closely tied to the Communist Party. In this context, it is less relevant to oppose government organs and Party entities than to recognize their close interconnection in the production of public policy.

By contrast, Chapter VIII highlights a more direct presence of the Party in the institutional communication of certain companies studied, particularly in the WeChat publications of spin-offs from state-owned groups. These posts include explicit references to the Party, repeated mentions of "Party-building" activities, and a codified iconography and epic narrative style. These elements are analyzed in the relevant chapter and constitute a distinctive feature of the SOE spin-off's communication strategy on the social media platform.

Typology of Enterprises

Although the definition of *commercial space* is acknowledged to be problematic, several authors propose typologies that distinguish between the various types of enterprises grouped under this broader label.

The report by Liu et al. for the IDA classifies Chinese space companies into four categories: (1) Commercial subsidiaries of SOEs; (2) Mixed-ownership corporations spun off from and backed by the Chinese Academy of Sciences (CAS) or universities; (3) Privately held start-ups, and (4) established private companies and their subsidiaries[57].

Walsh suggests a different typology distinguishing between: Type 1, made of Companies that Emerge from Government-Run Space Programs. Type 2, comprising Companies That Are Spin-offs from the Traditional Space Industry. Type 3, Companies That Are Strictly Private. Type 4; Publicly Listed Companies. Although the distinction between Type 1 and Type 2 is not

[57] I. Liu and al, Evaluation of China's Commercial Space Sector p. 37.

entirely clear, the examples provided suggest that Type 1 refers to companies emerging from SOEs such as CASC and CASIC, while Type 2 refers to spin-offs from CAS[58].

Han et al. also propose a typology that distinguishes between: (1) established and emerging startup companies; (2) state-owned enterprises (SOEs); and (3) Chinese Academy of Sciences (CAS) spin-offs. It should be noted, however, that this division does not clarify whether it refers to SOEs themselves or their spin-offs[59].

A relative consensus can thus be observed in the specialized literature around the existence of at least three main categories of actors: (1) independent start-ups, (2) companies affiliated with public conglomerates (notably CASC and CASIC), and (3) enterprises linked to the Chinese Academy of Sciences (CAS).

Building on this foundation, my research proposes an operational typology, applied to the case study of commercial launch companies. This typology distinguishes between: private enterprises (or *minying*); spin-offs from state-owned groups (SOEs), primarily CASC and CASIC; and mixed-ownership structures, supported by entities affiliated with the CAS.

The analytical relevance of this typology is demonstrated in Parts IV and V of this dissertation, which explore in greater detail the economic, financial, and discursive dynamics specific to each profile. For commercial enterprises affiliated with SOEs, the term *spin-off* is preferred over *subsidiary*. Indeed, analysis of their shareholding structures and their evolution between 2020 and 2023 reveals the presence—and growing number—of external investors, meaning these are not wholly owned subsidiaries.

Common Doubts

Difficult Access to Chinese Sources on Commercial Space in China

The difficulty of access to sources is underlined by several authors, yet at the same time, three of the reports mentioned also underline the importance to rely on Chinese material[60].

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[58] Kathryn Walsh, Ian Christensen, and Rob Ronci, "Lost Without Translation - Identifying Gaps in U.S. Perceptions of the Chinese Commercial Space Sector" (Secure World Fundation, February 2021). p.23

[59] Yuexia Han et al., "A PIE Analysis of China's Commercial Space Development," *Humanities and Social Sciences Communications* 10, no. 1 (October 28, 2023): 1–11, https://doi.org/10.1057/s41599-023-02274-w. p.3

[60] Irina Liu and al., « Evaluation of China's Commercial Space Sector » p.9-11; Pollpeter and al., « China's Space Narrative »p.1-3; Kathryn Walsh, Chris- tensen,andRonci, « Lost Without Translation » p.2-8.Rome, "China's Space Export Strategy." p.2

In the chapter dedicated to Chinese Commercial Space of the CASI report by Pollpeter and al., the reliability of accessible sources, both reporting and academic, is called in question:

"Although there is no shortage of reporting on China's commercial space activities, much of the information on these companies remains murky, making it difficult to verify information and leaving gaps in our understanding. Many Chinese academic writings and newspaper reports on commercial space are anecdotal and do not offer insights into the state of the domestic industry as a whole."[61]

The last sentence echoes difficulties I encountered during the research process, particularly the challenge of identifying relevant academic or specialized sources within a mass of available data. In this dissertation, I present the use of the CNKI platform to introduce the existing research on the topic of commercial space in China. I then critically discuss the nature of these findings, including the institutional affiliations of the authors and conducting content analysis. These lines of research are conceived as direct responses to the challenges highlighted by various authors who have addressed the topic of commercial space in China.

Liu and al. mention very concrete issues front the point of view of researcher well versed handling documents from the PRC, including occasional lack of completeness of online databases; absence of official websites; difficulties accessing and interpreting field interviews. These difficulties were also faced during the conduct of the research for this PhD dissertation.[62]

Walsh and al. particularly explored the lack of access to local sources as a reason for the existence of gaps of perceptions between US stakeholder and their own assessment of commercial space:

"*There are various reasons why it is challenging to access [information sources on China's commercial space sector], with the lack of Chinese language skills being the most substantial and obvious hurdle. Publicly accessible translations of Mandarin-language material are sparse in the U.S., which limits access to information circulating the Mandarin speaking community to those that can access quality translation services or must otherwise rely on free automated translation software (such as Google translate) which has accuracy shortcomings. This leads to many stakeholders having to rely on the perspectives of the few space sector analysts who can access the materials. Furthermore, the geopolitical sensitivities and perceived risks of interacting with Chinese counterparts within the space industry limit the opportunities to*

[61] Pollpeter et al., "China's Space Narrative - Examining the Portrayal of the Us-China Space Relationship in Chinese Sources and Its Implications for the United States." p.34
[62] Irina Liu et al., "Evaluation of China's Commercial Space Sector." p.8

develop personal relationships with Chinese nationals that may be able to field questions or provide a Chinese perspective to their American counterparts."[63]

Hence, beyond language barriers, the authors identify a problem with a scarcity of expertise on the topic being concentrated between the hands of a "*a small set of 'gatekeepers'*" and the lack of people-to-people exchanges in the space industry between China and the US. In an original fashion, the report by Walsh and al also explored the limitations posed not only by Chinese sources, but also by US-based analyses on the as a reason for the existence of gaps of perceptions.

"*The space industry is inextricably linked to national security issues, and so the geopolitical context surrounding China and the United States is heavily present in discussions about the U.S.-China space relationship, and industry's role in it. Often, in U.S. literature the future of China's space industry is framed through a lens of great power competition, and national ambitions to increase space capabilities and independence are considered in relation to impact on U.S. national security.*" [64]

This remark, which highlights the existence of pre-established narratives surrounding commercial space in the PRC, aligns with the argument made in a strand of critical literature concerning analyses of China's broader space activities, particularly as they appear in documents related to public policy in the United States.

Epistemological Issues Raised by English-Language Sources

An Identified "Chinese space threat" Discourse

A strand of literature has long denounced the presence of epistemological biases in how China's space activities are addressed in certain English-language sources. According to these authors, the narratives surrounding the topic, particularly as found in U.S. public policy documents, contribute to the discursive construction of a threat.

Cameron Hunter completed a dissertation on the subject, identifying the emergence and growing influence of a "Chinese space threat" narrative after the 2000s, especially following the release of the Rumsfeld Commission's conclusions[65]. His work explores the history, context,

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[63] Kathryn Walsh, Christensen, and Ronci, "Lost Without Translation." p.11
[64] Kathryn Walsh, Christensen, and Ronci. p.11
[65] Donald Rumsfeld et al., "Report of the Commission to Assess United States National Security Space Management and Organization," January 11, 2001, https://aerospace.csis.org/wp-content/uploads/2018/09/RumsfeldCommission.pdf.

and implications of these narratives. He argues that during this period, in public policy documents:

"Almost every American source that cares to mention China's space program agrees that its recent surge to prominence constitutes a grave threat to the national security of the United States of America."[66]

One of the early advocates of this critique is Gregory Kulacki, whose 2009 report co-authored with Jeffrey Lewis, *A Place for One's Mat*, sought to rehabilitate the perception of China's space activities. The report moves away from a narrowly military-focused, mainstream perspective to emphasize the importance of a diversity of motivations. "*For example, we have often heard Americans say that the PLA 'runs' the Chinese space program.*"[67] The authors notably highlight China's pursuit of international standing—a "place at the table," or rather, *a place for one's mat* [一席之地 *yi xi zhi di*] through historical analysis and interviews.

Michael Sheehan draws a similar constat concerning a fraction of the English language littrature on Chinese space activities: *"For the proponents of the 'China threat' interpretation, China is vigorously pursuing a wide range of military space capabilities, including counterspace (anti-satellite), in order to acquire the ability to conduct asymmetric warfare against the United States. This is seen as being an entirely logical and predictable strategy for China, which has correctly identified the space-based assets of the United States as being the 'Achilles heel' of its military power."*[68]

While discussing the evolving role of the military and public security in a broader sense within Chinese space policymaking, he emphasized the importance of prestige for the Chinese public alongside political and developmental objectives, broader concerns related to public security and their relation to modern Chinese history during the century of humiliation. As he summarizes: *"Viewing Chinese policy through the prism of US-Chinese relations, and the over-emphasis on the military dimension, encourages a misleadingly narrow interpretation of the factors which drive China's space program."*[69]

Lincoln Hines also explored the importance of public opinion as a driver for Chinese space exploration and science, as well as inhabited flights programs, conducting an online poll of over

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[66] Cameron Hunter, "The Rise of China in Space Technopolitical Threat Construction in American Public Policy Discourse" (University of Bristol, 2018), https://research-information.bris.ac.uk/ws/portalfiles/portal/183271194/Final_Copy_2018_09_25_Hunter_C_PhD.pdf. p.181.
[67] Gregory Kulacki and Jeffrey Lewis, "A Place for One's Mat: China's Space Program, 1956–2003" (American Academy of Arts and Sciences, 2009). p.29
[68] Sheehan, "'Did You See That, Grandpa Mao?" p.109
[69] Sheehan. p.107

1400 online respondents based in the PRC. He also states "*In explaining China's pursuit of space power, analysts often focus on the role of China's military doctrine*". [70]

It is important to note that neither Kulacki and Lewis nor Sheehan seek to deny the existence of military or, more broadly, defense and national security motivations in the development of China's space activities. Rather, these authors point out that such considerations should not be the sole analytical lens in the English-language literature, and that other rationales do exist.

In relation to our topic, the aim is not to dismiss works that examine the military and defense rationales behind China's commercial space activities, but rather to highlight the diversity of objectives, some of which remain underexplored due to a dominant focus on China's military capabilities and the threat they may pose to the United States. For instance, Nie presents and critiques the role of the Military-Civil Integration (MCI) or［军转民 *junzhuanmin*] strategy, yet his article does not fall within a "China space threat" discourse.[71]

Yongjing Zhang speaks of a "*strategic gaze*" extending a geopolitical envisioning of great power rivalry into space by certain US based intellectuals. He makes this strategic gaze responsible for having "*produced an imaginary of China as a threatening other, bent upon pursuing relentlessly a military space strategy aimed at a contest of supremacy in space with the USA*"[72].

Suzuki suggests an historical explanation to the overwhelming presence of military analysis in analyzing Chinese space activities:

« *Because the aerospace industry, which includes the space segment, has been a champion of the defense industry in Europe, and space technology in the United States and Soviet Union was developed by the drive for the military use of space, it is therefore easily assumed that the space sector is developed by the logic of security (including homeland security).* »[73]

A discourse also Present in Analyses on Commercial Space in China

Certain rhetorical elements found in the CASI report *China Private Aerospace Companies* echo the types of discourse criticized by the authors mentioned above. The report provides a risk

[70] Hines, "Heavenly Mandate."
[71] M. Nie, « Space Privatization in China's National Strategy of Military-Civilian Integration: An Appraisal of Critical Legal Challenges », Space Policy 52 (1 May 2020): 101372, https://doi.org/10.1016/j.spacepol.2020.101372.
[72] Yongjin Zhang, "The Eagle Eyes the Dragon in Space: A Critique," *Space Policy* 29, no. 2 (April 26, 2013): 113–20, https://doi.org/10.1016/j.spacepol.2013.03.002. p.120
[73] Suzuki, "Space Policies of Japan, China and India." p52

assessment for a list of commercial space enterprises established in the PRC, emphasizing their potential ties to the PLA. The methodologies used to conclude the presence of "links to the PLA" are open to question, including mentions of the Civil-Military Integration (CMI) strategy on the official websites of the companies studied, or their participation in defense-related innovation awards.

"General Secretary Xi Jinping and other senior Chinese Communist Party leaders are implementing policies designed to make China a science and technology superpower as well as to build a military capable of fighting and winning high-tech wars. […] Initiatives are underway to make large, state-owned defense enterprises more efficient, globally competitive, and innovative by drawing upon the commercial sector for inspiration and innovative dual- use products. This initiative is manifested in the national "Military-Civil Fusion" campaign launched in 2012. […]"[74]

The second CASI report on *China's Space Narrative* shows similar rhetorical patterns, presenting Civil-Military Integration (CMI) as the primary rationale behind the emergence of commercial space in China, using language that can be perceived as alarmist and confrontational: *"As part of China's overall military-civil fusion policy that is intended to capitalize on the crossover between military and civilian technology applications, China's space program is increasingly focused on generating commercial and economic benefits. China's space program appears to be establishing a long-term rationale for space exploration that goes beyond national security and scientific exploration to treating space as the final frontier of economic expansion."*[75]

One aspect that is rarely addressed in the critical literature on analyses of China's space activities is the way in which "otherization" within these narratives tends to construct an image of a unified, organized, and rational whole. In the second CASI report by Pollpeter et al., quoted above, this effect is particularly striking in the repeated use of the term "China's"—suggesting that a single, cohesive entity is simultaneously responsible for civil-military integration policy and the entire Chinese space program. This rhetorical shortcut tends to subsume a wide range of activities involving a considerable diversity of actors engaged in the formulation and implementation of these policies under one monolithic entity: "China" or the "Chinese Communist Party."

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[74] Hull, Markov, and Griffin, "'Private' Chinese Aerospace Defense Companies," June 2020. p.4
[75] Pollpeter et al., "China's Space Narrative - Examining the Portrayal of the Us-China Space Relationship in Chinese Sources and Its Implications for the United States." Chapter 4: Making China Rich: China's View On Commercial Space and Space Natural Resource Extraction p.29

This discursive pattern and its critique reminded me, at the outset of my research on commercial space, of a previous fieldwork experience focused on China–Africa relations, more specifically the bilateral ties between the PRC and Angola.

In that field, certain scholars, particularly those affiliated with the China Africa Research Initiative at Johns Hopkins University under the direction of Deborah Brautigam, advocated for the rigorous analysis of quantitative data (notably regarding loans issued across the continent) and for fieldwork-based research that could nuance the prevailing narrative of China as a "rogue donor" or "neo-colonial" actor in Africa[76].

In the specific case of Angola, the work of Lucie Corkin emphasized the agency of Angolan elites in negotiating loan agreements with the PRC[77]. Her findings and my own highlighted the fragmented nature of the Chinese actors involved in bilateral relations: from the Ministry of Foreign Affairs to state-owned enterprises, the migrant workers they employed, and even mafia-like intermediaries facilitating interactions between Chinese and Angolan authorities. These actors often pursued divergent, even contradictory agendas, in sharp contrast with the mainstream portrayal of the Chinese state as monolithic and omnipotent.

From the conceptual standpoint of the critical authors cited in the previous subsection, such simplification could be analyzed as necessary for constructing the idea of a "Chinese space threat." That notion implies a coordinated planning effort involving all stakeholders in Chinese space policymaking and program implementation, working together in a unified project that threatens US interests.

Yet this kind of framing obscures the identification of the various actors involved in commercial space activities in China—whether state bodies, industry players, financial institutions, or entrepreneurs. More importantly, it prevents recognition of potential divergences of interest, lack of coordination, or even tensions between these actors. This is, in fact, one of the central findings of the doctoral research presented in this dissertation: to identify the plurality of actors involved—at times pursuing divergent agendas—the complex puzzle that lies behind what is too often portrayed as a singular "Chinese masterplan."

While Walsh et al. do not explicitly link the presence of a "Chinese space threat" narrative among their American interviewees to the concept of otherization, they do nevertheless point out its detrimental effects on understanding of US stakeholder of commercial space activities

[76] Deborah Brautigam, *The Dragon's Gift: The Real Story of China in Africa*, Oxford University press, 2009.
[77] Lucie Corkin, *Uncovering the African Agency - Angola's Management of China's Credit Lines*, Taylor&Francis (University of London, 2013).

in the PRC: "*China is recognized as pursuing commercial activities in space, but U.S. stakeholders commonly view China as monolithic with the Chinese government and its extensions as the sole driving force of Chinese commercial space. Therefore, there is skepticism to the idea that there are private or semi-private entities with purely capitalistic drivers behind their actions*" [78]

Sheehan draws a connection between the difficulty of accessing reliable sources and the prevalence of neorealist analyses of China's commercial space sector, which frame these activities within a narrative of great power rivalry:

"Like all national space programmes, China's is driven by a variety of influencing factors and objectives, whose relative weight may vary over time. During the last twenty years of the twentieth century analysing these factors was complicated, because the evolutionary pattern of Chinese space development did not seem to follow a consistent trajectory or velocity, so much so that one leading US analyst of the programme described it as 'a mystery within a maze'[79]*. […] This pattern lent itself to a western narrative in which China's space programme was seen as having undergone a significant acceleration as a result of a growing desire to pursue great power capabilities and particularly the military space assets which the US had demonstrated so dramatically in the 1991 Gulf War against Iraq*[80]*. This reflected a neo-realist interpretation of China's position in contemporary international politics."*[81]

Echoing the observations made by the authors in the previous subsection, it is also worth noting that in the CASI reports cited at the beginning of this subsection, *only* the Civil-Military Integration (CMI) policy is mentioned as the broader policy framework behind the emergence of commercial space in China. Yet no substantial demonstration is offered as to how, concretely, CMI is articulated with Chinese commercial space activities.

Given the opacity surrounding the functioning of China's space sector, as discussed earlier, it could be understandable that CASI reports limit themselves to drawing a reasonable parallel between CMI and commercial space, and to proposing informed hypotheses regarding the connection between the two.

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[78] Walsh, Christensen, and Ronci, "Lost Without Translation - Identifying Gaps in U.S. Perceptions of the Chinese Commercial Space Sector." p.22
[79] Quoting Joan Johnson-Freese, *The Chinese Space Program: A Mystery Within a Maze* (Krieger Pub., 1998).
[80] Quoting Dean Cheng, 'China's military role in space', Strategic Studies Quarterly, Spring 2012; Eric Hagt, Matthew Durnin, 'Space: China's tactical frontier', Journal of Strategic Studies, no. 34, 2011
[81] Sheehan, "'Did You See That, Grandpa Mao?" p.107

What is more surprising, however, is that parallels with other broader policy frameworks—those without direct military implications—are not mentioned in the same tone. For instance, no links are drawn to *High-Quality Growth* [高质量发展 *gao zhiliang fazhan*], *Innovation-Driven Development* [创新驱动发展战略 *chuangxin qudong fazhan zhanlüe*], or the *Made in China 2025* strategy—which, among other goals, seeks to modernize China's manufacturing capabilities. These policies, despite being featured as flagship initiatives by Chinese authorities and widely covered in English-language mainstream media, arguably share equally reasonable and objective affinities with the rise of commercial space in the PRC.

This dissertation explores the emergence of the Chinese commercial space sector through a combination of qualitative and quantitative data, focusing particularly on the case of commercial launch companies. Rather than taking the categories of "private" or "commercial" for granted, it interrogates their legal, economic, and political meanings within the Chinese context. It examines the evolution of public discourse, regulatory structures, and the investment landscape, while also assessing how different actors—state-owned, hybrid, or private enterprises—position themselves in relation to state policy and market dynamics. The goal is not only to offer a detailed empirical account but also to critically examine how narratives of commercialization are constructed, deployed, and contested in contemporary China.

Having established the motivations and methodological choices guiding this dissertation, particularly the reliance on Mandarin-language sources, this dissertation begins by interrogating the specialized discourse landscape on commercial space in China in mandarin language.

Part 1 – Mapping the Chinese-Language Literature on Commercial Space

In the introduction to this dissertation, we began with the observation that the English-language literature on commercial space in China, which remains limited particularly when it comes to academic work, presents several issues: the lack of a clear definition, the difficulty of accessing reliable Chinese-language sources, and the presence of analytical bias in English-language materials.

This research is therefore based on Chinese-language sources, with Part 1 of the dissertation dedicated to exploring how commercial space is defined and characterized in the specialized literature written in Chinese.

The following Part 1 is a review of the academic and more broadly specialized literature on the topic of commercial space in China conducted on China National Knowledge Infrastructure (hereinafter CNKI) between February and September 2022, which constitutes a reliable and easily accessible database for conducting documentary research on the PRC from abroad.

I. Chapter I – Conducting a Literature Review on CNKI

The first part of this chapter provides methodological suggestions as to how to conduct research on CNKI (Chapter I.A.). This will be followed by a critical analysis of the search results for "China commercial space" [中国商业航天 *zhongguo hangtian*] using the platform's embedded meta-analytic tools (Chapter I. B.). The next chapter will present a specialized and academic literature review from a sample of texts selected from the search results (Chapter II).

To our knowledge, as of September 2022, there was no prior publicly available equivalent work of a literature review of Chinese academic and specialized sources on the topic of commercial space, be it in English or in Mandarin[82].

Since no similar literature review has been conducted before, the review of the academic and more broadly specialized literature on the topic of Chinese Commercial Space does not have the ambition to be a comprehensive review of all existing literature on commercial space in mandarin, but rather to provide an overview of the way the question is treated in the academic and specialized press, and by whom.

Main Findings

Chapter I of this dissertation introduces, presents, and justifies the use of CNKI as a reliable and accessible source for collecting academic and specialized materials. A search is conducted using the keywords "China commercial space" [中国商业航天], which initially led to a macro-level analysis of the results based on the meta-analysis functions provided by the platform.

The number of publications available with this keyword on CNKI increased sharply between 2015 and 2018, reaching a peak in 2018–2019. These trends suggest that the term *commercial space* gained popularity during this period.

Among the seven most prolific publications, five are affiliated with units under the state-owned conglomerate CASC. This supports a hypothesis that CASC holds a *discursive dominance* in this domain, potentially exerting influence over the content of publications due to its institutional position.

[82] At the date of completion of this dissertation in January 2025, such a work was, to our knowledge, still non-existent.

The publications in question can be categorized as journals and specialized magazines, leading to the designation *academic and specialized* literature. An analysis of their editorial orientations, based on data available on CNKI, reveals varying levels of specialization, with a predominant focus on non-technical aspects such as policy, business, management, space programs, and international developments. With the exception of two publications that are more oriented toward military-industrial aspects, the remaining journals are specialized in space-related topics to different degrees. While some journals actively engage with commercial space, others do not consistently address the subject.

The ten most prolific authors in the CNKI search results for "Chinese commercial space" exhibit diverse professional backgrounds. Among them, Liu Yufei appears to be highly specialized in commercial space, having authored 13 articles included in the search results. Two authors are identified as journalists, Chen Weisan and Zuo Jian, while three are legal scholars specializing in international law, including Jiang Shengli and Zhang Zhenjun. One of these scholars, Feng Guodong, is also affiliated with a unit under CASC. Zhang Jingnan is employed at a CASC-affiliated institution. Additionally, Sun Jianfeng and Niu Min are recognized as commercial space experts affiliated with the FutureSpace Research Center.

The information gathered on these authors, including their thematic and disciplinary focus as well as their institutional affiliations, does not indicate a predominance of highly technical profiles. Rather, the majority are journalists, specialized legal scholars, or consultants. This finding aligns with the editorial orientations of the publications analyzed earlier. Furthermore, affiliation with a CASC unit does not appear to correlate with a specific publication format. The two identified authors affiliated with CASC contribute to articles covering diverse themes and employing varied formats.

Analyzing the distribution of search results by institutional affiliation provides a more nuanced assessment of the hypothesis regarding CASC's discursive dominance in specialized commercial space publications. While a significant share of the journals examined were sponsored by CASC-affiliated units, this overrepresentation did not necessarily extend to the most prolific authors. Yet, the conglomerate's various subsidiaries and institutes collectively contribute a substantial number of authors, including those with more minor contributions. This structural presence, in turn, may shape the overall discourse within these publications, hinting a potential structural bias in the Chinese literature on commercial space as well.

A. Gathering Data on CNKI

1. CNKI, the Largest Online Publishing Platform in the PRC

CNKI, [中国国家知识基础设施 *zhongguo guojia zhishi jishu sheshi*], also informally known as *Zhiwang* 知网 hereinafter CNKI, is the most important online publishing and aggregating platform in the PRC. Having benefited from a long-standing state support from its creation in the late 1990s, it has been said to contain 90% or more of academic articles published in the PRC, with a majority of its content on an exclusive basis[83].

As of today, CNKI website claims *inter alia:*

"*Over 1,600 institutional customers overseas across 60 countries and regions, 32,000 institutional customers from a various of industries in Chinese mainland*
Core users ranging from top universities, research institutes, government think-tanks, enterprises, hospitals to public libraries
Over 200 million end users, over 16 million daily visits, as well as 2.33 billion full-text downloads in 2021" [84]

In a recent article of China Media project, Chen and Bandurski found that: "*As the largest aggregator of academic electronic resources in China, CNKI covers more than 95 percent of published academic resources. As of January this year, CNKI included more than 8,540 journals in total, with more than 60 million full-text documents.*" [85]

In a piece for the Shanghai-based English-language publication Sixth Tone in 2019, Wang Yiwei introduced the platform as so prominent that "*nobody working on their dissertation in China can avoid using Zhiwang, the country's largest database of academic papers, more formally known as the China National Knowledge Infrastructure, or CNKI.*"[86] The author further claimed "*CNKI by 2018 had grown to include nearly 1,300 exclusive top-rated journals and the most comprehensive database of master's and doctorate papers — nearly half of which*

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[83] Pola Lem, "Could China Be on the Verge of Breaking Up Database Publishing?", *Times Higher Education*, 5 mai 2022, https://www.insidehighered.com/news/2022/05/05/china-verge-breaking-database-publishing.
[84] « CNKI project », consulté le 2 septembre 2022, https://oversea.cnki.net/index/Support/en/Project.html.
[85] Stella Chen, « CNKI's Security Problem », *China Media Project* (blog), 6 juillet 2022, https://chinamediaproject.org/2022/07/06/cnkis-security-problem/.
[86] Yiwei Wang, « Publish or Perish: How China's Elsevier Made Its Fortune », *SixthTone*, 24 juillet 2019, https://www.sixthtone.com/news/1004345/https%3A%2F%2Fwww.sixthtone.com%2Fnews%2F1004345%2Fpublish-or-perish-how-chinas-elsevier-made-its-fortune.

are only available on CNKI. It claims not just to be the domestic market leader, but also to be the "biggest academic database in the world."[87]

During the spring of 2022, CNKI raised public attention because of the opening of two investigation procedures (see Annex B. History and Investigations on CNKI) on its monopolistic practices as well as certain cyber-security issues. These news items only underline its prominence in the academic and informational landscape of the PRC and reinforce the legitimacy of its use for the conduction of a literature review on Chinese sources.

However, this investigation among other factors led to the suspension of access to CNKI databases from abroad, as partner libraries were blocked from it between April 2023 and April 2024. This interruption raises serious concerns regarding the access for researchers to reliable specialized sources on China as discussed in the next subsection.

2. General Remarks: Reliability, Accessibility, Feasibility

Several reasons motivated the choice of CNKI as a basis for conducting this literature review, which can be summarized as: reliability, accessibility and feasibility.

Regarding the reliability of the platform, its credentials and quasi-monopolistic nature, as discussed below, suggest that the articles available on it are likely representative of Chinese academic and specialized literature on commercial space. While the claim cannot be made that the articles present in the CNKI repository include all publicly available articles on the topic, we can reasonably suppose it contains at least the majority of such articles.

Moreover, in terms of accessibility, its legitimate and largely free of charge use from abroad, as well as the easiness of use and clarity in the presentation of results of the platform as well as its many useful functionalities are further justifications of the choice of CNKI as the basis for conducting the literature review within this chapter, in contrast to its competitors such as Chongqing Weipu [维普网 *weipu wang*][88], Wangfang Data [万方数据 *wangfang shuju*][89]. However, comparative documentary research on these platforms could constitute further leads of research. For the purpose of this research, the CNKI platform was accessed through a BULAC (*Bibliothèque Universitaire des Langues et Civilisations,* Language and Civilization

[87] Wang.
[88] "Weipu - Homepage," accessed March 24, 2025, https://www.cqvip.com/.
[89] "Wangfang Data - Homepage," accessed March 24, 2025, https://www.wanfangdata.com.cn/.

University Library) library account, the university library of INALCO (*Institut National des Langues et Civilisations Orientales* National Institute for the Study of Oriental Languages and Civilization). The sample of articles on which the content analysis is provided in Chapter II of this dissertation is composed of articles for which the full text was available through this account.

Both the previous arguments of reliability and accessibility touch upon the feasibility of conducting a literature review on CNKI. As a single access point to a vast number of Chinese academic and specialized productions that can be legally accessed from abroad, the platform is a tool of great practical value.

In Chapter I, I strive to present the platform and its use for the literature review in a manner that is clearly reproducible. One of the traditional objectives for academic work involves demonstrating rigor in assessment of evidence and substantiating the credibility of the results obtained, along with their limitations. However, Chapter I also fulfills a less common objective by not only presenting the research results but also explaining how they were achieved, thereby offering a methodological example that can be utilized by others, even in different research areas, hopefully including non-mandarin readers, in light of the limitations raised in the English-language literature highlighted in introduction.

One of the ambitions of this dissertation stemmed from a recurring observation in English-language literature regarding the difficulty of accessing Chinese sources, coupled with the inaccessibility of fieldwork during the COVID-19 pandemic. The aim was to propose a method, accessible even to non-Sinophone users, for obtaining reliable information from credible sources by developing user-friendly "manuals." This objective initially arose from a request by the French Embassy to contribute to a webinar titled *Chinese Fieldwork in the Face of the Pandemic: Imagining New Research Methodologies? Testimonies from Young Researchers in France* on November 10, 2021[90]. In this context, I sought to make a concrete contribution by promoting good methodological practices for using Chinese information platforms. Subsequently, my participation in the study day *China at Your Fingertips: Practicing Social Sciences Remotely* on November 3-4 2022[91] reinforced my belief in the utility of such work,

[90] Lucie Sénéchal-Perrouault, "Chinese Fieldwork in the Face of the Pandemic: Imagining New Research Methodologies? Testimonies from Young Researchers in France [Le Terrain Chinois à l'épreuve Du COVID-19 : Inventer de Nouvelles Méthodologies]" (Online Webinar - French Embassy in China, November 10, 2021).
[91] Lucie Sénéchal-Perrouault, "China at Your Fingertips: Practicing Social Sciences Remotely [La Chine à Portée de Clics, Pratique Des Sciences Sociales à Distance]" (AMU Aix Marseille, November 3, 2022).

proposing to systematically "make explicit" the use of Chinese online information platforms by presenting the source, the interface, and justifying the reliability of data from two platforms: CNKI and Aiqicha.

It should be noted that access to the CNKI databases at BULAC was suspended from April 2023 to April 2024 due to the compliance investigation outlined earlier, alongside broader measures to restrict data sharing abroad. These included the introduction of data transfer rules and laws in July 2022, which were presented to partner foreign universities as "measures for assessing cross-border data transfer and relevant laws"[92]. At the same time, in May 2023, restrictions on data transfers abroad imposed on the company WIND also led to geo restrictive measures for accessing Aiqicha, a major Chinese online corporate database offering detailed company information, under the same regulatory framework (see Part 4 Commercial launch Companies Financial Data).

Although access to CNKI has been restored —which is not the case of Aiqicha—, the potential for such disruptions poses a real challenge to retrieving academic and specialized sources from the PRC, generating concern among those studying the country from abroad (researchers, journalists, consultants, business professionals, etc.). [93] Such access interruptions are particularly detrimental to researchers, who are required to detail their methodology, including their access methods. Indeed, while workarounds exist for accessing various databases outside the PRC, these are manifestly illegal under Chinese regulations and less easily reproducible for novice researchers. They raise significant issues of legitimacy in the acquisition of evidence while conducting academic research based on Chinese-language sources.

3. Limitations

The advantages presented by the CNKI platform do not make it a flawless search tool nor an omniscient informant of the intellectual landscape in the PRC. It goes without saying that a number of opinions circulating among Commercial Space players in China including policy

[92] Pak Yiu, "China to Slash Foreign Researchers' Access to Academic Database," *Financial Times*, March 27, 2023, sec. Nikkei Asia, https://www.ft.com/content/93051bff-5af8-4841-8e1f-8c9ab0cbd3fe; Yi Lin, "Further decoupling? Why are Chinese academic databases shutting the door on foreign scholars? [进一步脱钩？中国学术数据库为何对外国学者关上大门 jin yi bu tuo gou? zhong guo xue shu shu ju ku wei he dui wai guo xue zhe guan shang da men]," VOA Chinese, March 29, 2023, https://www.voachinese.com/a/china-academic-database-slashes-foreign-access-20230328/7025597.html.

[93] The China Project Events, "Open-Source Intelligence in Crisis: Navigating China's Restrictions," *The China Project* (blog), September 22, 2023, https://thechinaproject.com/2023/09/22/open-source-intelligence-in-crisis-navigating-chinas-restrictions-2/.

making institutions; various research facilities; SOEs; commercial space startups etc. are not published in academic and specialized journals. As shown in Chapter II, commercial space is actively promoted by the highest levels of the political apparatus. This political endorsement shapes the boundaries of what can be said on the topic: a form of "politically correct" discourse emerges, while dissenting views tend to appear more discreetly or indirectly. Moreover, space activities more broadly can be considered a sensitive matter in terms of national security, which likely further restricts the freedom of expression of authors in publicly accessible publications.

Hence, while we can make the claim that the articles retrieved for this literature review are representative of the Chinese academic and specialized publications publicly available on the topic, we can express some reservations about the representativeness of the existing literature with respect to the opinion of certain other players of Chinese commercial space and how much relative space of expression they have on this medium.

Engaging with other types of sources, notably field interviews, allows for counterbalancing this politically correct discourse and identifying it as such, as developed in Chapter VII: a number of interviewees expressed much less polished views, which hinted at the presence of power dynamics and diversity of opinions in the framing of the research topic.

Another limit to this literature review is that we cannot be certain of the actual importance of these publications for players involved in commercial space activities in the PRC. While some quantitative information is provided by CNKI as to the volume of the readership *via* the number of downloads, it is difficult to comment on the readership of such publications which is at least partially edited and read in paper format, for which no information is available. Also, in qualitative terms, we do not have information concerning institutional paper subscriptions of specific laboratories, enterprises or universities, let alone who specifically within these institutions eventually reads these articles. Likewise, information concerning the online readership is publicly unavailable, albeit it is possible that the latter type of information could be provided by CNKI as a paid service.

Among the limitations posed by the platform CNKI, one must mention the high volatility of the results for the search words and the possible presence of lag and glitches in the digitization process. The results on the platform for the search words are volatile in the sense that they change very frequently over time, which is visible by the evolution of the metrics displayed. In a rather counter intuitive way, this evolution is not necessarily always upward going —which would simply mean that new articles corresponding to the search words are added to the

platform—, but sometimes downward going, which could imply a modification of whether existing articles correspond or not to the same search words. This raises a number of questions as to the functioning of and possible limitations pertaining to the technical functioning of the platform: lag between publication of a given article and digitalization of the content on CNKI; possibility on glitches in the cataloguing process; functioning of the algorithm behind the response to search words.

Another limitation imposed by CNKI is the display of results. Indeed, the drop-down lists which give some filtering data (authors, publication, year) do not allow to display all the results. Consequently, it is not possible for example to give the name of all the authors: the drop-down list only allows to display the inclusion of all the authors having published more than two publications, but does not allow to list all the authors having published only one —alone or in co-writing— which represent the majority of the search results.

B. Macro Analysis of CNKI Results for the Searchwords “China Commercial Space”

The structure of the CNKI website, which revolves around a search engine, makes search words the starting point for this literature review. After testing the keyword “commercial space” [商业航天 *shangye hangtian*], it was noticed that a significant part of the results were in fact focused on the phenomenon abroad, in particular in the US. Thus, the choice was made to use the search words “ China commercial space” [中国商业航天 *zhongguo shangye hangtian],* hereinafter also “the search words”, in order to restrict the results to those more relevant to the object of the present research. The effect of this filtering was a significant decrease in the number of results (384 versus 1575 as of December 2022).

On the other hand, it should be noted that it would be beyond the scope of this chapter to consult all the articles responding to the searchwords China commercial space, but simply to have a first overview, in the absence of previous literature review on the topic, and that a comparative literature research using “commercial space” as search words could be a lead for further research.

In order to conduct a documentary research, the search words were typed in the CNKI research toolbar, using the search function per “subject” (see Annex A. *Functioning of CNKI platform*), and focusing on the “Academic Journal” tab. A total of 384 results can be found in the “journals” database. These results (hereinafter also *result for the search words* or *search results*) constitute the basis for the analysis provided below.



The presentation of results can be organized and filtered on the platform according to a number of parameters presented in tabs on a sidebar. In the following subsections, we will propose a preliminary analysis based on four of them: the chronological distribution as available in the “Publication year” tab; the journals and magazines from which the majority of the articles originate in “Journals”; the authors in “Authors” and their institutional affiliations in “Affiliation”, as well as the research fields in which these articles fall in “Disciplines”.

This chapter being originally meant to be an academic literature review on Chinese Commercial Space, the choice was made to make the search on CNKI's China Academic Journal (CAJ) database, which allowed us to display only the articles available in the corresponding tab, whereas the basic search in "All" gave access to a number of newspapers, the study of which was outside the scope of this Chapter.

For our topic, the rationale for the qualification of a publication as academic and its presence on China Academic Journal (CAJ) database is not fully clear. Yet, it has an important influence on the accessibility to the full text of certain articles which depends on which database the CNKI user account has access to. Hence, results from the publication *Space Exploration* [太空探索 *taikong tansuo*], which under the "All" search category and not the "CAJ" reunites the third highest number of results for the search words with 50 articles, were not accessible via the BULAC account. More generally concerning the access, although the vast majority of articles on the CAJ database for the search words were accessible through the BULAC user account, some were not, which slightly limited the pool from which articles could be selected for analysis.

For the purpose of this chapter, the terms *academic and specialized literature* were favored. The results for this research on CNKI's CAJ and the selection of articles which is the basis for the synthetical analysis in the next Chapter show a diversity of form, including an important proportion of productions for which the term *academic* alone would be misleading.

The corpus of publications responding to the searchwords on CNKI is mostly constituted of journals and magazine articles that could be qualified as "opinion articles". This type of material is characterized by a short format (1 to 6 pages), accessible tone, and little or no references and footnotes. On the other hand, this situation is not necessarily specific to the PRC within our subject matter. Indeed, the topics of commercial space and New Space are not initially a subject of concern for scholars worldwide. As has been seen in the Introduction, the available English-language literature on Chinese commercial space is largely composed of "gray" publications, notably consultancy and think tank reports[94].

[94] Irina Liu et al., "Evaluation of China's Commercial Space Sector" (Washington: Institute for Defense Analyses IDA, September 2019), https://www.ida.org/research-and-publications/publications/all/e/ev/evaluation-of-chinas-commercial-space-sector; Kathryn Walsh, Ian Christensen, and Rob Ronci, "Lost Without Translation - Identifying Gaps in U.S. Perceptions of the Chinese Commercial Space Sector" (Secure World Fundation, February 2021); Hull, Markov, and Griffin, "'Private' Chinese Aerospace Defense Companies," June 2020;

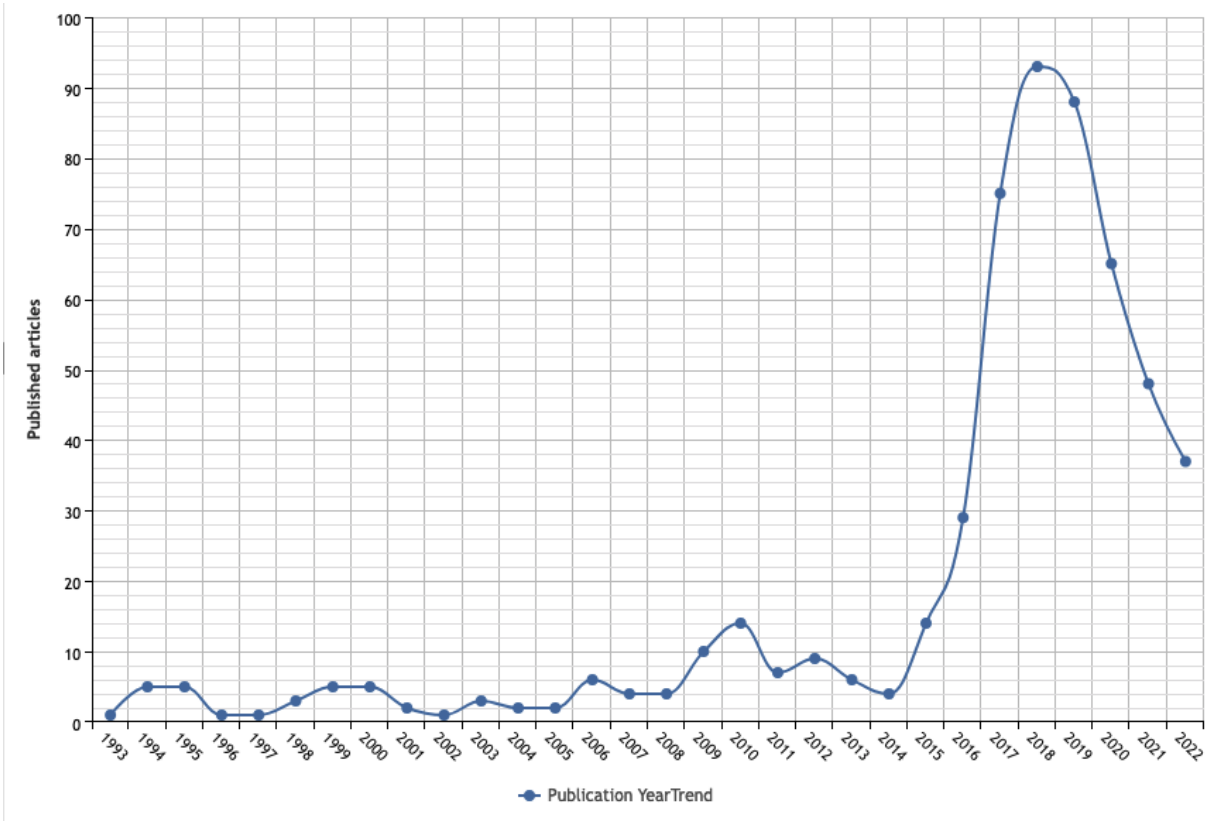
Since the publication in the search results on CNKI, even if some are to be found in academic journals, do not seem to be peer-reviewed, one can fear less rigor in the content and formulation.

These articles make limited use of footnotes or lacks them entirely. This made the "mapping" of the existing literature in Chinese on the topic of commercial space more difficult. This caveat could be partly made up for through other methods, notably the recourse to CNKI metrics: identification of most prolific journals and authors, and of potentially more impactful articles via the number of downloads or citations (see infra on the use of CNKI).

Nevertheless, if the question of whether the articles composing the search results are indeed academic articles or not remains open, the fact remains that these journals are present in the CNKI CAJ database, which indicates a certain credibility and, hopefully, a certain guarantee as to the quality of their content.

Pollpeter et al., "China's Space Narrative - Examining the Portrayal of the Us-China Space Relationship in Chinese Sources and Its Implications for the United States."

1. *Distribution over time of the results for the search words China Commercial Space on CNKI database: Peaking in 2019*



Several remarks can be drawn from this graph.

Between 1993 and 2014, the number of publications for the search terms “China commercial space” remained relatively stable, with an average of 4.5 articles per year. In total, 449 articles were published between 2015 and September 2022. The presence of a total of 100 articles on CNKI before 2014, a year commonly regarded by English-language authors as the starting point of commercial space in China, suggests that a prior phenomenon was already taking shape in the preceding two decades. In this dissertation, this earlier stage is referred to as “space commercialization” (see Introduction and next Chapter II).

After that first period of time, the number of publications available for the searchwords increased sharply, reaching a peak in 2018-2019 (88 and 93 articles respectively). These figures tend to support the hypothesis that the word “Commercial space” enjoyed particular popularity around these dates.

The number of articles published on the topic of commercial space dropped significantly between 2018 and 2022. In 2020, only 65 articles were published, 48 in 2021. This decrease in

the number of publications could have several explanatory factors. One is the COVID-19 period, during which all economic and arguably academic activities slowed down. Another is the number of crackdowns that started in the Chinese economy over that period. The increased scrutiny of the State notably in the tech-related sector led to the demise of tycoon figures such as Jack Ma, and arguably led the proponents of free entrepreneurship to be more prudent about expressing their opinion.

2. CASC as Sponsor Institution to Main Publications

a. *Presentation of the Seven First Publications*

The distribution of the results for the search words in the Academic Journal Database of CNKI retrieved on November 14th 2022 is as follows:

Name	**Results**	**Sponsor institution**	**Creation**	**ISSN**	**Periodicity**
Satellite and Network 卫星与网络	78	China Satcom; Beijing Shiji Hengyu Culture Communication Co. Ltd 北京世纪恒宇文化传播有限公司	2000	1672-965X	Monthly
Aerospace China 中国航天	51	China Aerospace Academy of Systems Science and Engineering 中国航天系统科学与工程研究院	1978	1002-7742	Monthly
Satellite Application 卫星应用	35	Beijing Institute of Space Science and Information 北京空间科技信息研究所	2010	1674-9030	Monthly
Space International 国际太空	24	Beijing Institute of Space Science and Information	1979	1009-2366	Monthly
National defense Industry Science and Technology	17	SASTIND news and publicity department	1992	1009-5225	Monthly

国防技术工业		国家国防科技工业局新闻宣传中心			
Aerospace Industry Management 航天工业管理	7	China Aerospace Academy of Systems Science and Engineering 中国航天系统科学与工程研究院	1983	1004-7980	Monthly
Dual Use Technologies and Products 军民两用技术与产品 junmin liangyong jishu yu chanping	6	China Aerospace Academy of Systems Science and Engineering 中国航天系统科学与工程研究院	1988	1009-8119	Monthly

A synthetic presentation is given below for the first seven publications concentrating most of the articles displayed by the search words on CNKI. This presentation will analyze their editorial line, topic of focus and tone.

This work was performed in order to constitute a preliminary mapping of the players expressing themselves on the topic of Chinese commercial space in PRC intellectual landscape and better understand the context of such expression by identifying their topical focus (engineering, international studies, law or others); tone and target audience (technical, specialized content or accessible content). This effort responds to the difficulties highlighted by English-language authors, as discussed in the Introduction, in identifying and accessing relevant Chinese-language sources. The mapping is further developed in the following two subsections, which focus respectively on the authors and their affiliated institutions.

Firstly, we can remark the relatively concentrated character of the search results among journals. More than 56% of the results are in the first six journals, hence the interest to present them.

The most important finding about these seven publications as an ensemble is the unequivocal presence of China Aerospace Science and Technology Corporation (hereinafter CASC) institutes and enterprises as the sponsor for five of these publications, and co-sponsor in one.

Thus, China Aerospace Academy of Systems Science and Engineering and Beijing Institute of Space Science and Information, both research institutes of CASC, are the sole mentioned sponsors for five out of the seven main publications linked to the search results. Respectively,

Aerospace China; *Aerospace Industry Management*; *Dual Use Technologies and Products* are sponsored by China Aerospace Academy of Systems Science and Engineering. *Satellite Application* and *Space International* are sponsored by Beijing Institute of Space Science and Information. The journals sponsored by these two institutes account for more than the third (36%) of the research papers constitutive of search results on CNKI.

Satellite and Network, which is the publication whose articles constitute around 20% of the results for the search words in the CAJ database, has two sponsors on its CNKI page: China Satcom, which is a company owned by CASC and another fund, Beijing Shiji Hengyu Culture Communication co. Ltd.

Finally, *National defense Industry Science and Technology* is sponsored by the news and advertising department of State Administration of Science, Technology and Industry for National Defence (SASTIND).

The macro-analysis of CNKI entries for the research terms highlight a very strong presence of certain institutions, laboratories, and companies affiliated with CASC. This finding is particularly important, as it may influence the content of the discourses produced in Chinese academic and specialized literature on commercial space. For example, the editorial policies of these entities could encourage specific narratives and terminologies while excluding others. In this dissertation, we will use the term *discursive dominance* to define this state of affairs.

The participation of State-Owned Enterprises (SOEs) in Chinese commercial space activities and the modalities of such participation are points of debate among different authors. The fact that five out of seven of the most prolific publications on the subject are affiliated, either directly or indirectly, with CASC effectively places the group in a position of being both "judge and jury", allowing it to shape discourses according to its own interests. The use of the definition of commercial space to support specific goals has been openly criticized by two authors, Liu Yufei and Shen Nian, debated Chapter II.

The point here is not to challenge the validity of the content published by these journals at face value, but to highlight the possibility that this content may exhibit biases in favor of CASC's interests. we underscore the existence of a *de facto* discursive dominance. Whether this dominance *has tangible consequences* is addressed and nuanced in the discourse analysis conducted in Chapter II.

Finally, it is necessary to emphasize that CASC is an extremely large state-owned conglomerate, employing approximately 170000 people in 2024[95], with its workforce distributed across a multitude of institutes and subordinate units. Given this scale, it would be an oversimplification to treat CASC as a monolithic entity where all perspectives on commercial space are uniform.

However, despite this internal diversity, CASC presents itself as and is considered as a cohesive group with specific interests by analysts studied Chapter II and stakeholders interviewed Chapter VII. This is evidenced in documentary research, for example by the content of promotional documents identified in the sample of articles analyzed in Chapter II. Furthemore, CASC and its subordinate units are constitutive of a *State-Owned Enterprise (SOE)* or a *traditional enterprise,* as contrasted with *minying* enterprises both in the literature and in interviews. Drawing comparisons between these different types of entities offers insights into their structural characteristics, strategic positioning, and the ways in which they contribute to shaping the broader commercial space sector in China.

b. *Editorial Line of the Main Journals*

Methodological remarks

The initial intention of this subsection was to cross the quantitative data available on CNKI with more qualitative information to be retrieved on these publications' official pages. However, the research done on search engines Baidu and Google did not allow us to find an official website for any of the publications but one: *National Defense Industry Science and Technology*.

The search results for the mentioned magazines on these engines, including by adding the search words "official website", referred to a series of commercial sites playing the role of intermediaries between the publications and the authors. The choice has been made not to use the information presented on these platforms. On the one hand, the very nature of these sites poses a problem of conflict of interest, as the platforms have an interest in presenting the journals in a positive light in order to convince a potential client to use their matchmaking services. On the other hand, the origin and reliability of the information present on some pages was clearly suspicious: for some publications, different sites give different "ranks"; false

[95] "China Aerospace Corporation 'Reveals Its Bottom Line'! Why Is SpaceX, with Only Just over 6,000 Employees, so Strong? [中国航天集团'透底'！仅 6000 多名员工的 SpaceX，为什么这么强？ Zhong Guo Hang Tian Ji Tuan 'Tou Di'! Jin Liu Qian Duo Ming Yuan Gong de SpaceX, Wei Shen Me Zhe Me Qiang?]," *Finance Sina*, August 21, 2024, https://finance.sina.com.cn/roll/2024-08-21/doc-inckitnw4990936.shtml.

repetitive positive comments have been spotted on another page; while the presentation of the journals lacked objectivity and tended to be extremely laudatory.

In order to overcome this lack of official webpage problem and to be able to give an assessment of the editorial line of these publications without having access to a presentation text from the journal itself, the following methodology was implemented. From the page dedicated to the journals on CNKI (see Annex A.), it was possible to access all the issues published by the journal, organized by year and then by issue. The preliminary analysis of the editorial line of these journals is based on the study of three summaries for each of the journals: the last available issue, April 2019 and May 2016 through the automatic translator DeepL from Mandarin to English.

This methodology allows to establish a rough typology of the type of articles that can be found in the journal and the editorial tone of the latter in order to understand the context in which the articles dealing with Chinese commercial space are placed.

Analysis

While it remains difficult to precisely categorize these publications as either journals or magazines, they are, in any case, specialized in thematic areas. Consequently, the term *academic and specialized literature* is used to describe them.

The tone of the articles varies, ranging from a formal, specialized style resembling academic discourse (*Aerospace Journal*, *Satellite Applications*, *Aerospace Industry Management*, *Dual Use Technologies and Products*) to more concise and flexible formats reminiscent of specialized press publications (*Satellite and Network*, *Space International*).

The majority of these publications focus on space-related topics, encompassing activities and policies in the broad sense—*Satellite and Network*, *Aerospace China*, and *Space International*—while others concentrate on more specific domains, such as *Satellite Applications* and *Aerospace Industry Management*.

Two publications, however, are not primarily centered on space: *National Defense Industry Science and Technology* and *Dual Use Technologies and Products*. Notably, these journals focus on defense and dual-use (civil-military) technologies, as well as broader military-industrial issues. We saw in Introduction that the English-language literature on commercial space, comprised a number of authorsfocus on the military dimensions of China's commercial

space sector[96]. These publications could thus serve as valuable sources for researchers investigating such topics.

With the exception of *Satellite Applications* and *Dual Use Technologies and Products*, most of these publications do not address technical and technological aspects as the main topic of focus. Instead, they are largely accessible to a non-technical audience, covering themes such as policy, business, management, programs, and international developments.

National Defense Industry Science and Technology presents a unique case, as its editorial approach differs significantly from that of other journals. It features a notable presence of articles dedicated to political meetings, likely reflecting its affiliation with SASTIND's news and propaganda department. As we will see in Chapter VIII of this dissertation, this type of department is also active in the WeChat publications of SOE, sharing similar content in a specific style.

Understanding these editorial orientations provides critical context for analyzing discussions surrounding China's commercial space sector within both academic and professional circles. A more detailed outlook for each of the publication screened is presented below.

Satellite and Network

The editorial tone of *Satellite and Network* is accessible; most technical articles presenting specific technologies are rather at the end of the editions. The title of the articles is easily understandable and gives off a rather dynamic and journalistic impression. The presence of a section containing WeChat trends was noted, possibly based on traffic data for the pages of certain articles available on the official WeChat account of the journal, which shows a certain modernity of the medium relative to other publications.

Satellite and Network publishes a variety of article types. The screening of the summaries makes it possible to identify the following typology of articles from their titles:

- Articles tackling commercial space centered around global and foreign trends of the space industry, activities of foreign commercial space enterprises.

[96] For example Andrew W Hull, David R Markov, and With Eric Griffin, "'Private' Chinese Aerospace Defense Companies" (CASI), accessed March 7, 2022, https://www.airuniversity.af.edu/Portals/10/CASI/Books/CASI_Chinese_Aerospace_Defense_Companies.pdf.

- Articles analyzing national and foreign space policies, notably the ones of the USA.
- A large number of articles focused on space technologies, particularly national ones, rather in the second part of the magazine.
- Articles on domestic and foreign space programs and activities.

Aerospace China

In terms of tone, *Aerospace China* focuses rather on policy and programmatic aspects rather than technical issues, making it an accessible publication for the non-technical reader. The tone is quite serious and it is a specialized publication, the first two thirds of volume being composed of special dossiers covering issues in 4-6 pages, whereas the last third gives place to shorter, more journalistic formats.

Aerospace China also publishes a variety of article types according to the screening of the table of contents, mainly focusing on four types of articles:

- National and foreign institutional space activities.
- Domestic and foreign commercial space activities.
- Analysis of foreign and national space policies. It should be noted that the ones pertaining foreign policies mainly concern the United States, and deal in particular with military policies.

Satellite Applications

The tone of *Satellite Application* is quite highly specialized. At the beginning of each month, after an editorial, a national and international overview of the sector's trends is offered. The publication then focuses on specific themes and concrete cases of use of space technologies, which corresponds to its title, and constitutes more than 80% of the content with articles from 2 to 4 pages. Hence, *Satellite Application* would be rather intended for a public of professionals of the sector.

The *Satellite Application* publication profile is above all concentrated around a type of publication which concerns case studies of applications based on satellite data, which is reflected in the title.

- Application of technologies, space systems or business models around concrete case studies or concepts.

Other types of articles have been identified by the screening:

- Analysis of national and foreign space policies.
- Policy Analysis notably civil military integration.
- National commercial space.
- National and international space activities (monthly review, conferences).
- Space trends.

Space International

The editorial tone for *Space International* is slightly specialized in terms of focus: as its title indicates, a large proportion of articles tackle foreign space endeavors. Yet, like *China Aerospace*, the focus being programs, policy and business, it remains accessible to the no-technical reader, its titles being even quite playful at times. Some thematic articles focusing on technology could be more technical in nature, even though they don't constitute the mainstream of publications.

As a result to the title screening, the articles contained in the journal include:

- Space missions and programs, both institutional and commercial, in China and around the world.
- Space technologies, both foreign and national.
- Space enterprises, both foreign and national, in the latter case both state owned and commercial enterprise presentations could be identified.
- Space policies and cooperation, space history both foreign and national.
- International space policies and cooperation mechanisms.
- International space trends notably business and industry.
- Space military.
- Conference notes.

National defense Industry Science and Technology

Several elements lead us to believe that *National defense Industry Science and Technology* is an official SASTIND magazine whose views are representative of the institution.

National defense Industry Science and Technology is the only publication for which an official site was found using Baidu and Google search engines. It is actually a page on the SASTIND website, where all the issues are available in pdf format. The bottom of the page says that “the host unit” [主办单位 *zhuban danwei*] is SASTIND, and that the “undertaking unit” [承办单位

chengban danwei] is the news and publicity department. The publication also bears the same name as the one of the office in mandarin [国家国防科技工业局 *guojia guofang keji gongye ju*]. Finally, all covers for the magazine have a mention before the title saying "supervised by SASTIND" [国家国防科技工主管 *guojia guofang keji gongye ju zhuguan*].

The editorial tone of *National Defense Industry Science and Technology* takes up elements of language and propaganda of the public authorities in the field of technologies and defense industries. The typology of articles in some of the summaries include:

- Articles dedicated to political meetings of specific or broader bodies related to the military industry, the publication of important texts. Located generally in the first third of the edition.
- Thematic articles about military industry reforms: digitalization, national champions, civil-military integration, mixed ownership, intellectual property...
- Articles dedicated to specific technologies in the fields of navy, aviation and space.
- Articles dedicated to companies of the state military-industrial complex, possibly for their promotion and dissemination of best practices.
- Historical and commemorative articles about the military industry.

Aerospace Industry Management

Based on a review of selected tables, *Aerospace Industry Management Science and Technology* is a highly specialized journal that focuses primarily on the presentation of research and management practices in the aerospace field. The editorial tone is technical, the recurring themes and expressions seem to be specific to the field of management studies. The types of articles primarily include:

- The presentation of management models, methods and systems relevant to the aerospace field or subfields down to specific production lines.
- The use of specific products, especially software.

Dual Use Technologies and products

Dual Use Technologies and Products is a publication featuring a variety of article types:

- As the name of the journal indicates, a number of articles are dedicated to the presentation of specific products and technologies. The products are generally presented in the title under military angles, although in one instance the civilian application was underlined.

- A number of articles focus rather on business practices presented as positive: managerial methods, human resources management, quality control etc.

- Articles are devoted to the presentation and analysis of policies in a more or less wide scope, sometimes in the form of a call for applying existing policies in a somewhat propagandist tone, sometimes in the form of feedback on a sector, a company or a pilot project in particular that has been applying them. In the vast majority of cases, these are national policies, but examples have been identified tackling US technology transfer and CMI policies.

- Some articles are devoted to specific enterprises or bodies.

3. Authors: a Diversity of Profiles

a. *Presentation of the Ten First Authors*

The distribution of search results according to authors on CNKI is as follows. The table below presents the 15 authors who have published two articles or more.

Chinese name (number of articles in search results)	**Pinyin pronunciation**	**Affiliation (translation)**	**Affiliation**
雨菲(9)	Yu Fei	Aerospace Processing Engineering Technology Research Institute Co.(Beijing) Co., Ltd.[97]	航天加工程技术研究院（北京）股份公司
陈惟杉(5)	Chen Weisan	People's Daily	人民日报社
刘雨霏(4)	Liu Yufei	Aerospace Processing Engineering Technology Research Institute Co.(Beijing) Co., Ltd.	航天加工程技术研究院（北京）股份公司
蒋圣力(4)	Jiang Shengli	East China University of Political Science and Law	华东政法大学
张京男(4)	**Zhang Jingnan**	**China Academy of Systems Science and Engineering**	**中国航天系统科学与工程研究院**
冯国栋(4)	**Feng Guodong**	**Shanghai Academy of Spaceflight Technology (SAST)**	**上海航天局[98]（上海航天技术研究院）**

[97] Name Dftranslation by the author, no official English name exists for the enterprise

[98]

张振军(4)	Zhang Zhenjun	International Institute of Space Law	国际空间法学会
孙剑锋(3)	Sun Jianfeng	Beijing Future Aerospace Space Technology Research Institute	北京未来宇航空间技术研究院
牛旼(3)	Niu Min	Beijing Future Aerospace Space Technology Research Institute	北京未来宇航空间技术研究院
左键(3)	Zuo Jian	36Kr	36 氪
王小军(2)	**Wang Xiaojun**	**China Academy of Launch Vehicle Technology**	**中国运载火箭技术研究院**
何善宝(2)	He Shanbao	Beijing University of Posts and Telecommunications	北京邮电大学
李华栋(2)	Li Huadong	Beijing Institute of Space Technology Information	北京空间技术信息研究所
唐亚刚(2)	**Tang Yagan**	**China Long March Rocket Co., Ltd.**	**中国长征火箭有限公司**
代建（2）	Dai jian	China Academy of Aerospace Standardization and Product Assurance	中国航天标准化与产品保证研究院

What stands out in this table, based on the previous analyses, is the relative diversity in the backgrounds of the authors. While a certain number are affiliated with CASC (in bold), there are also individuals employed by a variety of institutions: journalism (People's Daily); specialized media (36kr, FutureSpace); universities (Beijing University of Posts and Telecommunications, East China University of Political Science and Law, International Institute of Space Law). Thus, while the most prolific publications are largely associated with CASC, the authors that wrote the maniest articles are not necessarily working as employees of CASC and its related units. This fact helps to put the previously mentioned discursive dominance of CASC into perspective.

c. *Profile for the Ten First Authors*

Methodological Notes

In order to provide a presentation of the ten first authors, they were first identified using the filtering function of the results proposed by CNKI. The second step consisted of a screening of the overall publications on the author's CNKI dedicated page. This double screening allowed to determine whether the authors publishing on that topic specialize on the issue of Chinese commercial space, space activities in general, or have a larger scope of interest.

Analysis

As observed, the ten most prolific authors in the CNKI search results for the term “Chinese Commercial Space” exhibit diverse professional backgrounds.

The most prominent author, Liu Yufei, appears to be highly specialized on the topic of commercial space, having authored 13 articles included in the search results. However, her institutional affiliation, the *Aerospace Plus Processing Engineering Technology Research Institute*, does not yield relevant search results that could provide further insights into her professional status.

Two authors are identified as journalists with varying levels of specialization: Chen Weisan contributes to *People’s Daily* on a range of topics, while Zuo Jian demonstrates a more concentrated expertise in the sector.

Among the most frequently appearing authors, three are legal scholars specializing in international law. One of them, Feng Guodong, is also affiliated with a unit under CASC. Jiang Shengli and Zhang Zhenjun are affiliated respectively with *East China University of Political Science and Law* and the *International Institute of Space Law*, a global association dedicated to space law.

Zhang Jingnan is employed at a unit under CASC. His presence is notably observed in roundtable discussions and interviews that bring together various commercial space enterprise representatives.

Sun Jianfeng and Niu Min are identified as experts specializing in commercial space. They are affiliated with the *FutureSpace Research Center*, a company engaged in consulting activities for both enterprises and the public in the field of commercial space.

The information gathered on the various authors (their thematic and disciplinary focus, as well as their professional affiliations) does not indicate highly technical profiles, as the majority are journalists, specialized legal scholars, or consultants. This observation aligns with the editorial orientations of the publications analyzed earlier.

Furthermore, affiliation with a unit under CASC does not appear to be correlated with a specific type of publication format. The two authors identified as affiliated with CASC contribute to articles covering distinct themes and employing varied formats.

Yu Fei

Yu Fei is the most prolific author in the results for the search words on CNKI with 9 published articles. It is also heavily suspected that Yu Fei is a pseudonym for Liu Yufei (see below), which would bring the total of articles published by that author within the search results to 13.

The tone of the titles of Yu Fei's articles in the search results is accessible, even playful at times. Their focuses are diverse, tackling commercial space in China at large, its evolutions and insertion within a larger policy framework, citing US and foreign examples or cooperation prospects.

The screening of Yu Fei's publications at large on CNKI as presented on the dedicated page reveals that the author specializes on space, giving a strong place to commercial aspects. About a third of the articles present titles that encourage the tendency of Chinese commercial space at large. Some of them focus on industrial perspectives, be it at large; on one particular sector or making a connection with other high tech policies. A few articles are dedicated to international aspects.

This page also allows us to know that Yu Fei publishes only in *Satellite and Network* and is affiliated to the Aerospace Plus Engineering Research Institute.

Title	Source	Publication Date	Cites	Downloads
Be proactive and seize the right to speak of Chinese space	Satellite & Network	2018-07-25		27
The time is right for capital to enter commercial space	Satellite & Network	2018-06-25		50
The U.S. "Commercial Space Agency" is coming!	Satellite & Network	2018-05-25	1	41
Commercial Space and manufacturing power	Satellite & Network	2018-05-25		53
China's commercial space, are you terrific yet?	Satellite & Network	2018-03-25		46

How to play Commercial Space in China? Analysis of SoftBank + "OneWeb" model	Satellite & Network	2017-08-25	1	67
Africa: The Emerging Land of Commercial Space in China	Satellite & Network	2017-07-25		49
The difference between Chinese commercial space entrepreneurs and Musk	Satellite & Network	2017-06-25	1	79
Exploring the concept of commercial space in the context of Chinese industry	Satellite & Network	2017-05-25		129

Liu Yufei

A number of elements lead us to suspect that Liu Yufei, who is the founder of *Satellite and Network* and vice head of Aerospace Plus Engineering Research Institute, is the same person as and the real identity of Yu Fei.

The title "Executive vice president of Aerospace Plus Engineering Research Institute" [航天加工程技术研究院常务副院长 *hangtian jia gongcheng jishu yanjiu changwu fuyuancheng*] can be seen next to the signature of both Yu Fei and Liu Yufei.

The names are largely similar. Not only the pinyin pronunciation and tone are identical but also in terms of character the two last are largely similar but for one key: Yu Fei [雨菲] on the one hand, Liu Yufei [刘雨霏] on the other.

In the first results on Google search engine for the search words Yu Fei Aerospace Plus Engineering Research Institute Executive Vice President (in Chinese) shows no result for Yu Fei, but does direct to the LinkedIn page of Liu Yufei.

The titles of Liu Yufei articles within the search results contain: one general article about Chinese commercial space, and one article about the importance of developing specialized consulting capacities in that matter.

The screening of Liu Yufei articles on the dedicated CNKI page underline the presence of a number of articles concerning space industry notably Beidou, reform of State enterprises and business, along with some articles about foreign enterprises namely Boeing and SpaceX.

Title	Author	Source	Publication Date	Cites	Downloads
The development logic and path choice of commercial space	Liu Yufei ; Shen Huai	Satellite & Network	2019-11-25		83
Huawei is coming	Liu Yufei	Satellite & Network	2019-10-25		28
No Consulting, No Business: The Importance of Commercial Space Information and Consulting Services in China	Liu Yufei	Satellite & Network	2019-02-25		72
What we expect from Commercial Space in 2019	Liu Yufei	Satellite & Network	2018-12-25		57

Chen Weisan

The titles of the articles by Chen Weisan appearing in the results show a certain interest for the launch sector and the inspiration of Elon Musk, with two titles for each respectively. One article's title sounds like a more general overview of Chinese commercial space.

The dedicated author webpage of CNKI indicates that Chen Weisan is affiliated to the People's Daily. The keywords for his interests include: industrial economy; economic structural reform; finance. Screening the titles of all the publications reveals that commercial space is only a minor topic of the author, who according to CNKI's data, has published 135 articles specializing in: economics, business and industry development with a specific interest for medicine, aerospace and real estate, legal and criminal matters, primarily in China but sometimes abroad; industrial and technology policies, economy and development. The author has published in *China Economic Weekly* [中国经济周刊 *zhongguo jingji zhoukan*].

Title	Author	Source	Publication Date	Cites	Downloads
Not Only Musk Has a Dream: Chinese Commercial Space Journey Begins	Chen Weisan	China Economic Weekly	2020-01-15		178
First launch into orbit! Zero breakthrough of private rockets in China	Chen Weisan; Xiao Yi	China Economic Weekly	2019-07-30		85

Exclusive Declassification of the Behind-the-scenes of China Aerospace's "First Show of Sea Launch"	Chen Weisan	China Economic Weekly	2019-06-30		58
Where is the spring of Chinese Musks?	Chen Weisan	China Economic Weekly	2019-04-15	1	166
Analysis of China's Commercial Space Market	Chen Weisan ; Yin Xin	China Economic Weekly	2018-11-26		

Jiang Shengli

The titles of the publications of Jiang Shengli appearing in search results reveal a high level of specialization in the tone and focus of the articles on legal and policies, innovation, investment and finance. The diversity of publication sources is also noticeable, in contrast to most of the other authors appearing first in search results, who only publish in one journal or magazine.

The screening of Jiang Shengli's publication at large on CNKIs dedicated web page reveals that he is a scholar specialized in international law, more specifically the law of international spaces. This matches information that can be retrieved online: according to the official website of the university, he is an associate professor at East China University of Political Science and Law (ECUPL) (International Law Institute) Jiang publishes on a number of issues in that field, among which space law hot topics (space resources ownership and exploitation; space traffic management; militarization) and national commercial space. Other titles reveal a certain interest in law of the sea, humanitarian law, and intellectual property.

Title	**Author**	**Source**	**Publication Date**	**Cites**	**Downloads**
Legal Policy Safeguards for Commercial Space Investment in China and the Development Practice of Private Enterprises	Jiang Shengli; Luo Yangdie	Zhangjiang Technology Review	2022-06-28		36
Legal Issues and Regulatory Approaches of the Space Assets Finance under the Background of Space Commercialization	Jiang Shengli; Dai Yuan	Journal of Shanghai University of Political Science and Law	2021-12-14 15:08		324
A Brief Analysis of the Practice and Problems of	Jiang Shengli	Space International	2019-07-25	4	249

Commercial Space Investment in China					
A Brief Discussion on the Soundness and Innovation of China's Commercial Space Finance Model	Jiang Shengli	Space International	2019-01-25	4	273

Zhang Jingnan

The titles of the articles retrieved from the research results and written by Zhang Jingnan are solely composed of interviews and minutes of round tables animated by him. For these articles, he acts not as an author but as the interviewer and compiler of experts and players in the field of commercial space.

The dedicated author webpage on CNKI for Zhang Jingnan reveals that his affiliated institution is China Academy of Systems Science and Engineering, an institute of CASC. He also acts as the chief editor of Aerospace China. His main areas of focus include foreign space enterprises, institutional and to a lesser extent military space activities, as well as Chinese commercial and, to a lesser extent, institutional space activities

Title	**Author**	**Source**	**Publication Date**	**Cites**	**Downloads**
Viewpoint About Four Industry Directions of Commercial Space	Zhang Jingnan	Aerospace China	2020-10-15		214
Experts Talk about New Opportunities of International Commercial Space Cooperation for Hainan Free Trade Zone	Zhang Jingnan	Aerospace China	2020-02-15		118
Interview with founder and CEO of Landspace Zhang Changwu Chinese Full Text	Zhang Jingnan	Aerospace China	2019-04-15		74
Interviews Niu Min, Founder of Future Aerospace Chinese Full Text	Zhang Jingnan	Aerospace China	2019-06-15		70

Feng Guodong

The title of the articles by Feng Guodong present in the search results indicate a legal approach. According to the dedicated page on CNKI, Feng Guodong is affiliated to Shanghai Space Office. This author ressembles Jiang Shengli in that both authors have a legal expert profile, and there is a greater diversity of journals in which they have published. However, the titles of Feng Guodong articles indicate he focuses only on space-related legal issues. Feng focuses mainly on commercial space and other space activities in regard to sovereignty, power and economic development. He also covers space law "hot topics", space resources and debris mitigation, studying international, foreign and domestic texts.

Title	Author	Source	Publication Date	Cites	Downloads
On the Construction of China's Legal System for Commercial Space	Feng Guodong	Aerospace China	2017-09-15	8	247
An International Law Critique of U.S. Domestic Law Restrictions on International Commercial Space Launches in China	Ding Wei; Feng Guodong; Li Zhi Gang	Aerospace China	2015-11-19	1	186
Legislation Requirement and Framework Study for China Space Industry	Feng Guodong; Shanghai Bureau of Astronautics	Science and Technology Management Research	2014-10-20	4	264

Zhang Zhenjun

From the title of the articles written by Zhang Zhenjun in the search results of CNKI, we can suppose he also has a legal background. According to CNKI data, the author is affiliated to the International Institute of Space Law (IISL).

The titles of the articles available on CNKI and published by Zhang Zhenjun reveal an interest in interactions between the law, commercial space and space industry. Some articles focus on US space policies and their international impact. The author has also written on the creation of Chinese aerospace think tanks and soft power in space.

Title	Author	Source	Publication Date	Cites	Downloads
Leading the Rule of Law and Building Business Environment for Commercial Space in China	Zhang Zhenjun	Aerospace China	2016-10-19	3	215
Some Reflections on the Construction of a New Think Tank for Chinese Spaceflight	Zhang Zhenjun	Aerospace China	2016-04-19		118
Legal Reflections on Commercial Space in China	Zhang Zhenjun	Aerospace China	2015-12-19	6	351
New US Space Security Policy and Its International Implications*	Zhang Zhenjun	Journal of Beijing Institute of Technology(Social Sciences Edition)	2013-05-22 16:21	5	425

Sun Jianfeng

The articles to be found in the search results on CNKI written by Sun Jianfeng are all co-authored by Niu Min and vice versa, leading to similar results. These consist in four reports from FutureSpace Space Technology Research Institute (or FutureSpace) for which the two authors work. It is interesting to note that these reports are quite recent and that they generate a steady level of downloads in the upper average.

The titles of the articles of Sun Jianfeng's bibliography reveal quite an intensive production of articles dedicated to commercial space with a focus on enterprises and general trends including Civil Military integration, with six articles published on the topic between 2019 and 2021, four of which co-authored with Niu Min. Prior to that, Sun Jianfeng seems to have focused on human resources questions applied to the space domain.

Title	Author	Source	Publication Date	Cites	Downloads
Research on Commercial Space Development Trends and Strategies in the Post-Epidemic Era	Sun Jianfeng; Niu Min	Space International	2021-03-25	2	257

Research on Commercial Aerospace Enterprises of the Department of Chinese Academy of Sciences from the Perspective of Industrial Chain Chinese Full Text*	Sun Jianfeng; Niu Min	Aerospace China	2021-02-15	1	223
Research on the Economic Development of China's Top 30 Commercial Aerospace Enterprises Chinese Full Text*	Sun Jianfeng; Niu Min	Aerospace China	2021-10-15	1	337
Progress of China's Commercial Space Industry in 2021	Sun Jianfeng; Niu Min	Space International	2022-03-25		363

Niu Min

The only articles written by Niu Min available on CNKI are the ones co-authored with Sun Jianfeng presented above. No affiliation is displayed on CNKI, yet the articles present both authors as working for FutureSpace.

Zuo Jian

According to CNKI, Zuo Jian has published a series of three articles in *Satellite Application* focusing on national commercial space at large and specific enterprises of or involved in commercial space: Deep Blue aerospace, Commsat, Jiake a CAS owned investment fund.

Although no affiliation is given on CNKI author's webpage, every single one of his articles indicates him working for 36Kr Zhejiang [36 氪浙江] which is a Chinese web media focusing on new technologies.

Title	**Author**	**Source**	**Publication Date**	**Cites**	**Downloads**
China's Commercial Space: Waiting for a breakthrough, welcoming opportunities	Zuo Jian	Satellite Application	2021-05-25		144
Deep Blue Space: From liquid rockets to verified recoverable long-termists	Zuo Jian	Satellite Application	2021-05-25		112

Domestic Commercial Space: Reviewing 2020, looking ahead to 2021	Zuo Jian	Satellite Application	2021-05-25		139

4. Affiliation: SOE Workers, Journalists, Academics

The distribution of search results according to affiliations is presented in the following table, which shows only those institutions that are associated with two or more articles. The identification of an article with an institution is probably based on the cataloguing of articles according to the author's affiliation. As a result, this information is likely to be influenced by human error, such as the registration of an institution under two names (e.g. Shanghai Space Bureau and Shanghai City Space Bureau)

Chinese caracters (number of results)	**English**
航天加工程技术研究院(北京)股份公司(13)	Aerospace Processing Engineering Technology Research Institute
中国长城工业总公司(9)	CGWIC
中国运载火箭技术研究院(9)	CALT
北京空间科技信息研究所(8)	Beijing Institute of Space Science and Technology Information
中国航天科工集团公司(8)	CASIC
人民日报社(7)	People's Daily
中国航天科技集团公司(7)	CASC
中国空间技术研究院(7)	CAST
中国航天系统科学与工程研究院(6)	China Aerospace Academy of Systems Science and Engineering
华东政法大学(5)	Huandong University of Politics and Law
中国空间法学会(4)	Space Law Study Group
中国航天信息中心(4)	China Space Information Center
中国中央电视台(3)	CCTV
北京跟踪与通信技术研究所(2)	Beijing Research Institute of Tracking and Communication
中国航天标准化与产品保证研究院(2)	China Space Standardization and Product Conservation Study Institute (?)
湖北省日报社(2)	Hubei Daily
桂林航天工业学院(2)	Guilin Space Industry Study Institute
上海市航天局(2)	Shanghai Space Office (SAST)
中国航天报社(2)	China Space Daily
上海航天技术研究院(2)	Shanghai Academy of Spaceflight Technology (SAST)

Analysis

The results presented in the table above offer valuable insights when connected to the previous subsections. Initially, we observed that a significant portion of the journals and magazines in the search results were sponsored by units affiliated with CASC. However, this overrepresentation of the conglomerate did not necessarily translate into the affiliations of the most prolific authors.

When examining the distribution of results by institutional affiliation for the total number of articles in the search results, the *Aerospace Processing Engineering Technology Research Institute* emerges as the leading entity, with the highest number of publications. It is reasonable to assume that this total corresponds to the articles authored by Liu Yufei, given that the number matches her total of 13 publications.

Nevertheless, units affiliated with CASC rank immediately below in terms of article count. More notably, CASC-affiliated entities collectively account for 56 out of the 104 top results. This suggests that while the "most prolific authors" may not necessarily be affiliated with CASC, the conglomerate's various enterprises contribute a substantial number of authors, including those with a moderate number of contributions. This could, in turn, influence the overall discourse within these publications.

Additionally, the presence of CASIC among the top five most frequent institutional affiliations in the search results is noteworthy, even though it is significantly less represented in absolute numbers compared to CASC.

Among the other affiliations, we find profiles that align with the categories previously identified, including media outlets and universities.

Chapter conclusion

This chapter has outlined the methodological foundations for my dissertation through a review of Chinese academic and specialized literature on commercial space, relying primarily on the CNKI platform. In addition to highlighting CNKI's strengths in terms of reliability and accessibility, it has examined the limitations of using such a platform—both technical and political—and underscored the impact of recent data access restrictions on international research.

The macro-level analysis of the CNKI search results has revealed both the institutional weight of CASC and the diverse range of authors contributing to the literature, many of whom are

journalists, consultants, or legal scholars rather than technical experts. This dual observation supports the hypothesis of a discursive dominance by institutional actors, while also revealing the fragmented and relatively low-profile nature of academic inquiry into commercial space in China.

Ultimately, this chapter serves as a methodological preamble to the rest of the dissertation. It not only justifies the use of Chinese-language sources and provides transparency in the research process, but also situates the discussion of commercial space within the broader challenge of accessing and interpreting knowledge production in the PRC.

II. Chapter II – Exploring Specialist Discourse: Analysis of a Sample of Articles

In this chapter, a content analysis of specialized Mandarin-language literature on commercial space is conducted, based on a selection of 30 texts retrieved from CNKI using the search words "China commercial space". This analysis allows us to refine and expand upon the findings from Chapter I regarding the type of literature available in Mandarin on this research topic.

The first part details the research method used to select the sample of articles (Chapter II.A.). The selected articles are then categorized into a typology to provide an initial overview of the corpus (Chapter II.B.). A qualitative analysis is then made, with particular insistence on the diversity of definitions for commercial space (Chapter II.C).

Main findings

About half of the of the sample can be classified as opinion pieces, in which authors defend an informed personal perspective. These articles are characterized by an accessible tone and a relatively short format. This has implications for the rigor of their content, as they typically do not include a methodology or theoretical framework nor explicitly engage with other authors through citations. As a result, it also affects the research process: since opinion pieces generally lack footnotes or bibliographic references, mapping different viewpoints on the subject becomes more challenging.

The second half of the sample is divided among research articles (3); legal studies (3); reports from FutureSpace (3); specialized press articles (2); CASC promotional texts (2); and forum accounts. This distribution echoes certain findings from Chapter I.

The presence of two texts identified as commercial communications from CASC may illustrate the implementation of discursive dominance, as hypothesized in Chapter I, based on the observation that one-third of research publications on this topic are funded by the group's research centers and laboratories. This suggests the existence of privileged publication channels for CASC

The content analysis of these articles focuses on definitional issues. First, I note that with only one exception, all articles expressing a position describe commercial space as a positive trend, and more than that as a necessary one. However, upon closer examination, this apparent consensus conceals a diversity of viewpoints structured around different definitions and conceptions of commercial space.

Two authors in the corpus explicitly address this issue and denounce a lack of clarity in the definition of *commercial space*: Liu Yufei, the most prolific author in the search results, and Shen Nian. It is particularly interesting to note that, while both authors start from a similar observation, they advocate for very distinct positions. Shen Nian is critical of commercial space activities, particularly private enterprises, which he criticizes for their amateurism and speculative nature. Liu Yufei, on the other hand, calls for a profound reform of the state sector, which she describes as stagnant, advocating for the creation of spin-offs funded and monitored by private capital.

By organizing the various definitions and typologies presented in other texts, the presence of an implicit debate over which types of enterprises should be considered part of commercial space and what roles these different companies should play is identified. A primary dichotomy emerges between state-owned enterprises (SOEs)—also referred to as the *traditional industry* or the *national team*—and private enterprises, generally described as *minying*. These findings match and expand upon the existing English-language literature presented in the Introduction.

Additionally, within the state system, some authors highlight the phenomenon of SOEs entering the commercial market, particularly through the creation of spin-offs. This phenomenon has a historical dimension, as its origins are traced back to the 1980s. This aligns with the findings of Chapter I regarding the chronological distribution of CNKI search results: research on *Chinese commercial space* dates back to the 1990s, well before the emergence of private enterprises in the market. Liu Yufei refers to this phenomenon as *space commercialization*, while other authors describe it as a *broad understanding* of the concept of commercial space.

It is plausible that certain articles deliberately sustain ambiguity regarding the definition of commercial space to serve the interests of state-owned enterprises, particularly CASC. This is particularly evident in the two identified promotional articles, which portray commercial space as a positive development while positioning CASC as a leading player in the sector. These articles contribute to—and possibly intentionally seek to—obscure the debate on the definition of commercial space, as the inclusion of SOEs remains a contested issue.

It is also possible that, amid broader definitional confusion, some authors—seeking to capitalize on a trending topic—use vague definitions themselves. As noted in Chapter I, the chronological distribution of CNKI search results shows that research on *Chinese commercial space* peaked around 2019, suggesting a surge in interest at that time.

A. Methodology

1. Selection Methodology

In order to conduct this documentary research, the search words “China commercial space” [中国商业航天 *zhongguo shangye hangtian*], were typed in the research toolbar of CNKI, using the search function per “subject”, using the “Academic Journal” tab, giving a total of 384 results (see Chapter I and Annex A. using CNKI).

As a first step, a selection of 10 articles was made based on their titles in order to “test the water”, that is to say: in terms of form, assess the quality of the articles selected and establish a preliminary typology; in terms of substance, determine the presence of common topics and arguments, or on the contrary controversies and opposing opinions. This methodology also allowed to exclude by title articles that seemed off topic. The dissertation being meant to focuses on commercial space at large, the launch sector in particular, articles focusing specifically on other fields were not considered.

The reading of this first batch of articles seemed to reveal the presence of a “doxa”, a general understanding of *commercial space* as being a desirable tendency, to be encouraged via various means, upon which articles offered variations and precisions, rather than polarized opinions. Common topics and arguments were identified. One author, Shen Nian, was identified as a remarkable non-mainstream opinion since presenting himself as opposed to commercial space

As a second step, the search tools provided by CNKI were used to establish a list of the 20 most relevant articles; another of the 20 most downloaded articles and finally one of the 20 most cited articles. These 60 articles formed a pool of articles among which 20 other articles were selected, privileging the time interval between 2015 and 2022.

The second batch confirmed the seemingly unified character of the points of view of the Chinese specialized literature on the subject of Commercial space as being rather enthusiast. However, it also allowed to underline the presence of different views holding notably to different definitions of the concept, in particular different types of enterprises including SOE-related enterprises and private, or *minying* enterprises.

The list of arguments and reasonings was completed until extra articles no longer offered new perspectives. A more detailed typology was elaborated. Having gathered a lot of interesting

information and in order to allow time for further research, the selection of articles for this literature review was then stopped.

This methodology, although it does not allow us to qualify this literature review as fully comprehensive, nevertheless permits to have a representative general view of the framework in which Chinese authors publish on the theme of commercial space.

	Article Name
1	Liu, "The Concepts of Space Commercialization and of Commercial space 航天商业化与商业航天的概念 [*hangtian shangyehua yu shangyehangtian de gainian*]" Satellite and Network, no. 08 (2015): 22–24.
2	Jisen Liu et Yufeng An, "The European Space Industry and the Enlightment 欧洲航天工业政策及对中国的启示 [*ouzhou hangtian gongye zhengce ji dui zhongguo de qishi*]", Military Economic Research, no. 09 (2006): 72–75.
3	Gao Li et Xiaoguang Zhang, "The Influence and Revelation of Deregulation on the US Commerical Space Industry [*fangsong guanzhi dui meiguo shangyehangtian fazhan de yingxiang ji qishi*] 放松管制对美国商业航天发展的影响及启示", Satellite Application, no 01 (2015): 58-61.
4	Xianyu Wang, "Study of Commercial space Quality Control Management [shangye hangtian zhiliang guanli yanjiu] 商业航天质量管理研究", Quality and Reliability, no 04 (2017) : 54-57+67.
5	Xionghui Tong et Baozhu Wang, "Risk Study of China's Commercial space Development [woguo shangye hangtian fazhan fengxian yanjiu] 我国商业航天发展风险研究", Aerospace China, no 06 (2018): 28-30.
6	Yuanyuan Liu et Xiaojin Zhang, "The development and the Legal and Regulatory System of Space Commercialization [hangtian shangyehua jiqi falv guizhi] 航天商业化发展及其法律规制", Global Market Information Guide 22 (2018).
7	Baohua Yang, "Practise and Exploration of China Commercial space [zhongguo shangye hangtian de shilu yu tansuo] 中国商业航天的实践与探索", China Aerospace, no 01 (2018): 6-10.
8	Xiao Liu, Yagang Tang, et Chenglong Rao, "Thoughts On the Regulation of Development of Commercial space Launchers in China [guanyu guifan woguo shangye hangtian yunzai huojian fazhan de sikao] 关于规范我国商业航天运载火箭发展的思考 ", Aerospace Industry Management, no 02.
9	Nian Shen, "Opinion on "Commercial" Space ["shangye" hangtian chuyi] "商业"航天刍议", China Aerospace, no 12 (2018): 49.
10	Nian Shen, "Rediscussing "Commercial space" [zaiyi "shangyehangtian"] 再议"商业航天"", China Aerospace, no 07 (2019): 42-43.
11	Yufei Liu, "The Worries of China Space Commercialization and Commercial space [zhongguo hangtian shangyehua yu shangyehangtian de youxin] 中国航天商业化与商业航天的忧心", Satellite and Network, no 08 (2015): 26-28.
12	Yufei Liu, "The Prospects of China Space Commercialization and Commercial space [zhongguo hangtainshangyehua yu shangyehangtian de qianjing] 中国航天商业化与商业航天的前景", Satellite and Network, no 08 (2015): 30-33.

13	Yufei Liu, “Mixed Reform, A Window for Commercial space and Space Commercialization [hungai, wei shangye hangtian yu hangtian shangyehua dakaile de yi chuanghu] 混改,为商业航天与航天商业化打开的一扇窗”, Satellite and Network, no Z1 (2017): 12-15.
14	Hongqiang Gao et Bin Fu, “New Line of Thought on Commercial space Development [hangtian shangyehua fazhan de xin siwei] 航天商业化发展的新思维”, Satellite and Network, no 03 (2016): 38-43.
15	Haifeng Zhao et Chao Zhang, “Study on the Commercialization and Legislation of China Aerospace [zhongguo hangtian shangyehua ji falv zhengce de yanjiu] 中国航天商业化及法律政策问题研究”, Space International, no 10 (2017): 52-57.
16	Inventory of 5 Big Changes in the Space Industry over the Past 50 Years: The Rise of Commercial space [Pandian 50 Nian Hangtianye 5 Da Zhongyao Bian Hua: Shangyehua Hangtian Xingqi] 盘点 50 年航天业 5 大重要变化：商业化航天兴起’, China Science and Technology Network in Heilongjiang Science and Technology Information 12 (2013): 7–9.
17	Guodong Feng, “Discussing the Construction of China Commercial space Legal System [lun zhongguo shangye hangtian de falv tixi goujian] 论中国商业航天的法律体系构建”, China Aerospace, no 09 (2017): 8-14.
18	Guozhu Gao, “An Analysis of the Domestic Legal Situation Based upon the Legislation of China’s Space Law [woguo hangtian fali fasuo yituo de guonei falv huanjing fenxi] 我国航天法立法所依托的国内法律环境分析”, Journal of Northwestern Polytechnical University (Social Sciences)., no 04 (2019): 71-80+118.
19	Yantao Zhang et al., “CASC Opens Wide Commercial space Door [zhongguo hangtian keji dakai shangye hangtian da men] 中国航天科技打开商业航天大门”, Talents magazine, no Z5 (2020): 29.
20	Yu Pei, “Hainan Wenchang to Build China’s Only Commercial space Launch Site [Hainan Wenchang Jianshe Zhongguo Weiyi Shangye Hangtian Fashechang] 海南文昌建设中国唯一商业航天发射场”, China Business Journal, 7 November 2022.
21	Jianfeng Sun et Min Niu, “2021 Chinese commercial space industry’s progress [2021 nian zhongguo shangye hangtian changye jinzhan] 2021 年中国商业航天产业进展”, Space International, no 03 (2022): 36-39.
22	Jianfeng Sun et Min Niu, “Research on Commercial Aerospace Enterprises of the Department of Chinese Academy of Sciences from the Perspective of Industrial Chain [chanyelian shijiao xia zhongguo kexueyuan xi shangye hangtian qiye yanjiu] 产业链视角下中国科学院系商业航天企业研究”, Aerospace China, no 02 (2021): 47-52.
23	Jiayi Zhao, Guanghui Zhou, et Qi’ao Wei, “The Development Path of China’s Commercial Aerospace from the Perspective of Business Model Innovation [shangye moshi chuangxin shijiao xia zhongguo shangye hangtian de fazhan zhi lu]商业模式创新视角下中国商业航天的发展之路”, Science & Technology for Development 17, no 11 (2021): 1951-59.
24	Jian Zuo, “China’s Commercial spaceflight: Waiting for Breakthrough, Embracing Opportunities [zhongguo shangye hangtian jingdai tupo, yingjie jiyu] 中国商业航天:静待突破,迎接机遇”, Satellite Application, no. 05 (2021): 27–28.
25	Adrienne Harebottle et Yongyan Shen, “2020: a Turning Point for Chinese commercial space [2020 nian: zhongguo shangye hangtian de zhuanzhe dian] 2020 年：中国商业航天的转折点”, Satellite and Network, no 08 (2020): 34-36.
26	Jianfeng Sun et Min Niu, “Research on the Economic Development of China’s Top 30 Commercial Aerospace Enterprises [zhongguo shangye hangtian 30 qiang qiye jingji

	fazhan yanjiu]中国商业航天 30 强企业经济发展研究", Aerospace China, no 10 (2021): 49-55.
27	Shaoxian Yang et Hongwei Li, "2019 China Commercial space Development Prospects [2019 nian zhongguo shangye hangtian fazhan xingshi zhan wang] 2019 年中国商业航天发展形势展望", Satelllite Application, no 04 (2019): 48-53.
28	Jiayi Zhao, Guanghui Zhou, et Qi'ao Wei, "The Development Path of China's Commercial Aerospace from the Perspective of Business Model Innovation [shangye moshi chuangxin shijiao xia zhongguo shangye hangtian de fazhan zhi lu]商业模式创新视角下中国商业航天的发展之路", Science & Technology for Development 17, no 11 (2021): 1951-59.
29	Jingnan Zhang, "Viewpoint About Four Industry Directions of Commercial space [shangyehangtian sida chanye fangmian shendu guandian] 商业航天四大产业方面深度观点", Aerospace China, no 10 (2020): 26-34.
30	Zuo Jian "Guoke Jiahe:Multi-link layout of satellite manufacturing and satellite applications [guoke jiahe : duo huanjie buju weixing zhizao yu weixing yingyong] 国科嘉和:多环节布局卫星制造与卫星应用", Satellite Applications, 卫星应用, no 05 (2021): 26.

2. Reading Methodology

A final point regarding the research methods used for the Chinese literature review concerns the reading process. I chose to print all articles and read them in their original version, taking notes manually rather than relying on automatic translators such as DeepL or Google Translate.

It could be argued that this methodology is time consuming for a non-native Chinese speaker while technology affords more efficient means to reach the same result. Indeed, the choice of "manually" reading all texts is one of the reasons why my study sample of the literature review was limited to 30 articles.

Several reasons justify the choice of "analog" reading. Firstly, automatic translators, especially when translating large amounts of texts, fail to identify the presence of *sui generis* concepts that I argue are crucial in the understanding of a complex topic such as commercial space. For example, "民营" minying, which will be further debated of this dissertation, is translated as "private", which fails to appreciate the national, historically-rooted meaning of the term and the representations it can convey. Certain subtleties, such as the difference between commercialization [商业化 *shangyehua*], and [商业航天 *shangyehantian*], commercial space which will also be discussed below, are difficult to spot within automatically generated translation.

Secondly, automatic translators also cannot properly give an idea of the tone of the author, the choice of vocabulary, the presence of idioms etc.

Finally, as a non-native Chinese reader engaging in a PhD studying a phenomenon occurring in the PRC, it was also my responsibility to face those the texts in their original version. The reading of these texts in "analog" was also a mean for to improve my mandarin level in order to engage with more ease during field research and future studies.

3. Translation Methodology

In order to gain time, the quotations and excerpts that were identified as most relevant to be retranscribed in the analysis were translated, often with the help of DeepL translator, then doubled check to ensure a uniform translation of key terms.

B. Typology

The articles composing the selection can be divided among seven categories. These categories are meant as a support tool to the analytical part below and a manner to introduce the reader to the selection and give him or her an overview of the kind of articles that can be found on the topic of Chinese commercial space on CNKI, refining the macro results presented in the previous Chapter. In certain instances, the question as to put one article in one of the other categories is raised. For reasons of clarity, the decision was made to make these categories discrete.

1. Opinion Pieces

The main category of articles are opinion pieces, with 14 articles. These are characterized by an accessible tone giving the opinion of the author, a relatively short format, the absence of footnotes, presence of photographs as illustration. Opinion pieces can be subdivided among four subgroups. This format affects the rigor of their content, as they typically do not include a methodology, theoretical framework, or direct engagement with other authors through citations. It also impacts the research process as a result: since opinion pieces generally lack footnotes or bibliographic references, mapping the different perspectives on the topic becomes more challenging.

One group is the opinion piece articles focusing on commercial space as a concept, two of which are written by Liu Yufei[99], two others by Shen Nian[100]. The latter present the notable originality to be frontally opposed to commercial space, both as a concept and as a tendency, which is unique among all articles studied.

Another subgroup of opinion piece studying commercial space abroad and applying the practice to China, reuniting two articles, one by Liu Yufei on the chronology of commercial space in

[99] Yufei Liu, "The Worries of China Space Commercialization and Commercial Space [zhongguo hangtian shangyehua yu shangyehangtian de youxin] 中国航天商业化与商业航天的忧心," *Satellite and Network*, no. 08 (2015): 26–28; Yufei Liu, "The Prospects of China Space Commercialization and Commercial Space [zhongguo hangtainshangyehua yu shangyehangtian de qianjing] 中国航天商业化与商业航天的前景," *Satellite and Network*, no. 08 (2015): 30–33.

[100] Nian Shen, "Opinion on 'Commercial' Space ["shangye" hangtian chuyi] '商业'航天刍议," *China Aerospace*, no. 12 (2018): 49; Nian Shen, "Rediscussing 'Commercial Space' [zaiyi 'shangyehangtian'] 再议'商业航天,'" *China Aerospace*, no. 07 (2019): 42–43.

the US and Europe[101], the other by Li Gao and Zhang Xiaoguang is the one drawing parallel between space experience abroad and applying it to China[102].

Two articles are yearly outlooks, one of 2019 by Yang Xiaoxian and Li Hongwei[103], one of 2020 which is a translation in mandarin of a piece by Adrienne Harebottle[104].

The rest of opinion pieces focus on specific topics: policy and legal framework[105]; risk study on commercial space[106]; national security[107]; mixed reform[108]; IoT and narrowband application[109]; finance mechanisms[110].

2. Research Articles

The sample contained three articles which can be considered research articles[111]. These are mainly characterized by the presence of footnotes, a slightly longer format (six pages on

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[101] Yufei Liu, « The Concepts of Space Commercialization and of Commercial Space 航天商业化与商业航天的概念 [hangtian shangyehua yu shangyehangtian de gainian] », *Satellite and Network*, nº 08 (2015): 22-24.

[102] Gao Li et Xiaoguang Zhang, « The Influence and Revelation of Deregulation on the US Commerical Space Industry [fangsong guanzhi dui meiguo shangyehangtian fazhan de yingxiang ji qishi] 放松管制对美国商业航天发展的影响及启示 », *Satellite Application*, nº 01 (2015): 58-61.

[103] Shaoxian Yang et Hongwei Li, « 2019 China Commercial Space Development Prospects [2019 nian zhongguo shangye hangtian fazhan xingshi zhan wang] 2019 年中国商业航天发展形势展望 », *Satelllite Application*, nº 04 (2019): 48-53.

[104] Adrienne Harebottle and Yongyan Shen, "2020: a Turning Point for Chinese commercial Space [2020 nian: zhongguo shangye hangtian de zhuanzhe dian] 2020 年：中国商业航天的转折点," *Satellite and Network*, no. 08 (2020): 34–36.

[105] Yuanyuan Liu and Xiaojin Zhang, "The Development and the Legal and Regulatory System of Space Commercialization [Hangtian Shangyehua Jiqi Falv Guizhi] 航天商业化发展及其法律规制," *Global Market Information Guide* 22 (2018).

[106] Xionghui Tong and Baozhu Wang, "Risk Study of China's Commercial Space Development [woguo shangye hangtian fazhan fengxian yanjiu] 我国商业航天发展风险研究," *Aerospace China*, no. 06 (2018): 28–30.

[107] Xiao Liu, Yagang Tang, and Chenglong Rao, "Thoughts On the Regulation of Development of Commercial Space Launchers in China [guanyu guifan woguo shangye hangtian yunzai huojian fazhan de sikao] 关于规范我国商业航天运载火箭发展的思考," *Aerospace Industry Management*, no. 02 (2018): 41–43.

[108] Yufei Liu, "Mixed Reform, A Window for Commercial Space and Space Commercialization [hungai, wei shangye hangtian yu hangtian shangyehua dakaile de yi chuanghu] 混改,为商业航天与航天商业化打开的一扇窗," *Satellite and Network*, no. Z1 (2017): 12–15.

[109] Hongqiang Gao et Bin Fu, « New Line of Thought on Commercial Space Development [hangtian shangyehua fazhan de xin siwei] 航天商业化发展的新思维 », *Satellite and Network*, nº 03 (2016): 38-43.

[110] Jiayi Zhao, Guanghui Zhou, and Qi'ao Wei, "The Development Path of China's Commercial Aerospace from the Perspective of Business Model Innovation [shangye moshi chuangxin shijiao xia zhongguo shangye hangtian de fazhan zhi lu]商业模式创新视角下中国商业航天的发展之路," *Science & Technology for Development* 17, no. 11 (2021): 1951–59.

[111] Yufei Liu, "The Concepts of Space Commercialization and of Commercial Space 航天商业化与商业航天的概念 [hangtian shangyehua yu shangyehangtian de gainian]," *Satellite and Network*, no. 08 (2015): 22–24; Jisen Liu and Yufeng An, "The European Space Industry and the Enlightment [ouzhou hangtian gongye zhengce ji dui zhongguo de qishi] 欧洲航天工业政策及对中国的启示," *Military Economic Research*, no. 09 (2006): 72–75; Zhao, Zhou, and Wei, "The Development Path of China's Commercial Aerospace from the Perspective of Business

average), absence of illustration but presence of diagrams in two instances, higher degree of specialization although still comparable to the one of specialized opinion pieces. The biggest difference between the two types of articles is arguably a question of form, the latter seemingly more accessible and mundane, the former more academic.

3. Legal Articles

The sample contains three articles that were qualified as legal articles. In terms of form, one of them could also be a research article[112], the others are more like opinion pieces[113] [114]. These articles are characterized by a purely legal focus, and mention of very numerous legal, regulatory and policy documents.

The presence of a small core of legal articles in the sample can be linked to the findings of Chapter I, which highlight the presence of authors trained in legal disciplines among the most prolific contributors. This underscores the dynamism of this analytical approach to Chinese space activities more broadly, as legal studies perspectives are also the subject of a body of English-language literature, produced by both PRC and international authors.

4. FutureSpace Reports

Three texts are reports from FutureSpace Technology Research Institute, also known as FutureSpace (Weilai Yuhang) (Nos. 21, 22, 26). A discrete category is made for these reports which present a number of specificities: they are all written by the same two authors, Sun Jianfeng and Niu Yan; published after 2018 and based on information collected by the enterprise. The approach of the reports is decidedly quantitative, they base their conclusions on a number of databases and index, illustrated by diagrams and infographics.

FutureSpace defines itself as “The prime platform dedicated to the commercial space industry, committed to promoting the development of China's commercial space ecosystem”. It

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Model Innovation [shangye moshi chuangxin shijiao xia zhongguo shangye hangtian de fazhan zhi lu]商业模式创新视角下中国商业航天的发展之路.”

[112] Guozhu Gao, ‘An Analysis of the Domestic Legal Situation Based upon the Legislation of China’s Space Law [woguo hangtian fali fasuo yituo de guonei falv huanjing fenxi] 我国航天法立法所依托的国内法律环境分析’, *Journal of Northwestern Polytechnical University (Social Sciences).*, no. 04 (2019): 71-80+118.

[113] Haifeng Zhao et Chao Zhang, « Study on the Commercialization and Legislation of China Aerospace [zhongguo hangtian shangyehua ji falv zhengce de yanjiu] 中国航天商业化及法律政策问题研究 », *Space International*, nº 10 (2017): 52-57.

[114] Guodong Feng, « Discussing the Construction of China Commercial Space Legal System [lun zhongguo shangye hangtian de falv tixi goujian] 论中国商业航天的法律体系构建 », *China Aerospace*, nº 09 (2017): 8-14.

specializes in research and consultancy for the commercial space industry, which involves *inter alia* the publishing of reports on industry dynamics and investment research, and organization of conferences[115]. In this capacity, FutureSpace is also the organizer of the subfora dedicated to commercial space at the China Space Conference (CSC), which I attended during field research in 2023 and 2024, as detailed in Chapter VII.

5. Specialized Press

Two articles of the sample are constitutive of specialized press by Zuo Jian for the online publication 36kr Zhejiang[116] [117]. This is characterized by a very short format and the publication 36kr not being considered a journal but a newspaper. This classification is by no mean a judgement of value, as both those articles proved to defend original and up to date information.

36Kr [36 氪 *36ke*] is a media and information platform focusing on startups, technology, innovation, and venture capital established in 2010. It mainly publishes news and reports on tech startups and investment trends, organizing events, as well as networking and branding support to technology-related start-ups[118].

6. CASC Promotional Documents

Two articles in the selection can be considered promotional material for CASC. Although these texts do not present themselves explicitly as advertisements and are not visually distinct from other articles, this categorization is based on their substance: they focus exclusively on the corporation's activities, portraying them in a consistently positive light. This sets them apart from the other opinion pieces or specialized press articles included in the review[119] [120].

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[115] https://futurespace.cn/mobile/index.html

[116] Jian Zuo, « China's Commercial Spaceflight: Waiting for Breakthrough, Embracing Opportunities [zhongguo shangye hangtian jingdai tupo, yingjie jiyu] 中国商业航天:静待突破,迎接机遇 », *Satellite Application*, nº 05 (2021): 27-28.

[117] Jian Zuo, « Guoke Jiahe: Multi-Link Layout of Satellite Manufacturing and Satellite Applications [guoke jiahe duo huanjie buju weixing zhizuo yu weixing yinyong] 国科嘉和:多环节布局卫星制造与卫星应用 », *Satellite Application*, nº 05 (2021): 26.

[118] "36Kr - About," April 1, 2025, https://count.36kr.com/pages/about-en.

[119] Yantao Zhang et al., « CASC Opens Wide Commercial Space Door [zhongguo hangtian keji dakai shangye hangtian da men] 中国航天科技打开商业航天大门 », *Talents magazine*, nº Z5 (2020): 29.

[120] Baohua Yang, « Practise and Exploration of China Commercial Space [zhongguo shangye hangtian de shilu yu tansuo] 中国商业航天的实践与探索 », *China Aerospace*, nº 01 (2018): 6-10.

The presence of two texts identified as commercial communications from CASC may illustrate the implementation of discursive dominance, as hypothesized in the previous chapter. Their content remains promotional in nature, which could suggest the existence of privileged publication channels for CASC, as discussed in Chapter I, based on the observation that one-third of research publications are funded by the group's centers and laboratories.

7. Forum Accounts, Interviews

One article of the selection is an account from a forum, which is characterized by first person accounts from players in various sectors of commercial space 29.

With this methodological foundation, let us now turn to an in-depth analysis of how commercial space is framed in the selected literature.

C. Content Analysis

A first reading of the sample of texts gives the impression of a certain consensus among authors. Indeed, commercial space is, except for one author, unanimously held as a positive and or necessary and or inevitable phenomenon by those who express an opinion on the matter, either explicitly or implicitly.

A deeper read of the articles contained in the sample reveals that, in spite of these shared premises, there is a variety of definition and understanding for *commercial space* throughout the texts. In other words, if the authors generally agree on commercial space being a good thing to be supported and encouraged, *they do not necessarily hold a common view on what commercial space is.* A cornerstone in this divergence is the role of SOE and private enterprises in the scope of commercial space activity.

It is important to note that commercial space is not explicitly defined in all of the texts—a point that will be addressed in the next subsection. At this stage, the analysis focuses on the general impression conveyed by the corpus, namely a consensus around a largely undefined notion, and on synthesizing the various discourses by grouping together certain arguments.

1. An Apparent Consensus: Encouraging Commercial Space

d. *Commercial Space is Good*

At the exception of the two articles written by Shen Nian, all articles defend the view, either explicitly or implicitly, that commercial space is a good, necessary and/ or inevitable phenomenon.

Hot Topic

First, the argument that come the most often, in 13 articles in total, and generally to be found in the opening of the articles is that Commercial space is a hot topic (Nos. 4, 5, 6, 7, 9, 10, 11, 12, 15, 21, 23, 28)[121]. This element is not too surprising, indeed, beginning an article by emphasizing the popularity of the issue is a common rhetorical technique. Yet, it is another

[121] For the sake of clarity and to avoid excessively long footnotes, references to articles within enumerations are made using the numbers assigned to them in Table 1 of this chapter.

element to hypothesize that commercial space is or was a trendy issue at the time of writing, and should also render us prudent to the meaning to give to the term.

"*In the 21st century, commercial space, as one of the most eye-catching new concepts in the field of spaceflight, has attracted increasing attention and popularity in the international community. Many features and advantages, such as low cost, high efficiency, keen perception of the commercial market, and rapid response to high technology, have given sommercial space great potential and broad development prospects.*"[122]

Good Tthing

Commercial space is held as a positive tendency. Four authors qualify it outright as a good thing (Nos. 5, 6, 7, 12)

"*The essence of commercial space lies in advancing and applying space technology entirely through market mechanisms, including market-driven investment and operational models. This, in turn, significantly reduces the cost for humanity to access, explore, and utilize space, and better meets the growing demand for space technology, products, and services.* "[123]

"*An advanced road for the development of my country's*[124] *aerospace industry, it is also an inevitable choice for the integration of aerospace technology into serving the national economy.*"[125]

Although not all articles explicitly verbalize that commercial space is a desirable tendency, this is sometimes said in strong implicit terms. In one of CASC promotional articles, the following formulas can be found:

"*Developing Commercial space is an important way to implement the national strategy. […]. The development of Commercial space has become an important mission of the Group [CASC].*

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[122]Zhao, Zhou, and Wei, "The Development Path of China's Commercial Aerospace from the Perspective of Business Model Innovation [shangye moshi chuangxin shijiao xia zhongguo shangye hangtian de fazhan zhi lu] 商业模式创新视角下中国商业航天的发展之路." p.42

[123] Xianyu Wang, 'Study of Commercial space Quality Control Management [shangye hangtian zhiliang guanli yanjiu] 商业航天质量管理研究', *Quality and Reliability*, no. 04 (2017): 54-57+67.

[124] "My country" [我国 *woguo*]is a common turn of phrase to designate the PRC by Chinese authors.

[125] Guodong Feng, 'Discussing the Construction of China Commercial space Legal System [lun zhongguo shangye hangtian de falv tixi goujian] 论中国商业航天的法律体系构建', *China Aerospace*, no. 09 (2017): 8–14. p.14

[…] The development of Commercial space is an inevitable choice to meet market demand in the international arena."[126]

Great prospects

Nine pieces insists on great prospects for commercial space (Nos. 11, 12, 15, 17, 22, 23, 25, 28, 29). Sometimes, figures and projections are quoted to support this claim.

"*Globally, the development of the space industry has shifted from national mission-driven to commercial demand-driven, and the commercial value of the space industry has been fully manifested […]. The global aerospace economy currently totals about 3,300. The global space economy currently totals about $330 billion, of which the commercial space industry accounts for 76%.*"[127]

"*Currently, Commercial space has become a major trend in the development of the space industry worldwide. This is due to two factors: first, traditional spaceflight often begins with national will, and under the model of relying solely on government input, high costs and low returns on investment have become a major bottleneck limiting the development of spaceflight in various countries. Second, the global space economy reached $332 billion in 2015, with commercial space activities accounting for 76% of the global space economy, totaling $246 billion. Commercial space has become the mainstream and foundation of sustainable development of the space industry.*"[128]

e. *Commercial Space Is Inevitable, Necessary*

Over half the texts in the sample suggest, in one way or another, that commercial space represents an inevitable trend. This argument takes the form, in 10 instances, of a historical narrative that is purported to demonstrate the inescapable nature of the transition from "traditional" to commercial space over time. In four other texts, it is depicted as deriving from a natural evolution, governed by economic laws. Six articles emphasize its necessity of

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[126] Baohua Yang, "Practise and Exploration of China Commercial Space [zhongguo shangye hangtian de shilu yu tansuo] 中国商业航天的实践与探索," *China Aerospace*, no. 01 (2018): 6–10. p.6

[127] Yuanyuan Liu and Xiaojin Zhang, 'The Development and the Legal and Regulatory System of Space Commercialization [Hangtian Shangyehua Jiqi Falv Guizhi] 航天商业化发展及其法律规制', *Global Market Information Guide* 22 (2018). p.20

[128] Yufei Liu, 'Mixed Reform, A Window for Commercial space and Space Commercialization [hungai, wei shangye hangtian yu hangtian shangyehua dakaile de yi chuanghu] 混改,为商业航天与航天商业化打开的一扇窗', *Satellite and Network*, no. Z1 (2017): 12–15.

commercial space for national power, an argument that can also be linked to the broader claim that commercial space is a global phenomenon present in nine articles.

All of these arguments are examined in this subsection because, from a descriptive standpoint, they serve either to frame commercial space as self-evident or to construct it as such. For most authors of the articles of the sample, commercial space appears as a necessity in a dual sense: first, as an unavoidable development, one that is neither contingent nor optional; and second, as a transition that ought to be pursued, reflecting a more normative stance.

From an interpretative perspective, however, this discourse contains a paradox. If the transition to commercial space were truly self-evident and natural, one might question why it requires such vigorous advocacy. This paradox becomes all the more apparent when considering that, a significant number of articles aim to address various obstacles to this transition. Ultimately, the corpus does not provide a substantive justification for the legitimacy of commercial space. Instead, it is presented as a form of progress to be pursued for its own sake.

Chronology

Ten authors make a chronology of *commercial space* which also tend to present it as a necessary outcome of larger historical tendancies (Nos. 1, 3, 6, 7, 9, 15, 17, 23, 25, 30).

"*Before the end of the Cold War, the primary purpose of space activities in various countries was to serve political, military, scientific, and public interests. These activities were government-led, with state investment as the main driver and a highly monopolized market. After the Cold War, driven by the global trend of high-tech industrialization and as a necessary response to the contradiction between the enormous funding required for space technology development and the financial pressure faced by national budgets, major transformations took place in the space industry.*"[129]

"*On a global scale, the development of the aerospace industry has been transformed from the traction of national tasks to the traction of commercial needs*."[130]

[129] Li and Zhang. p.58

[130] Liu and Zhang, 'The Development and the Legal and Regulatory System of Space Commercialization [Hangtian Shangyehua Jiqi Falv Guizhi] 航天商业化发展及其法律规制'. p.20

"*Human spaceflight was born out of the military and political confrontation between the United States and the Soviet Union during the Cold War, but due to its huge market economic value, a new fruit - commercial space - has gradually emerged based on military and civilian spaceflight. The booming of commercial space has greatly contributed to the economic growth and technological development of the U.S. and Europe, and has become the main force of space activities in the U.S. and Europe. In recent years, China has made great progress in spaceflight, but Commercial space is still generally in its infancy due to the long-standing planning system.*"[131]

Biology, Scientific explanation

Commercial Space is presented by some authors as a natural and necessary step through the use of biological vocabulary, while others reference theories borrowed from management and economic sciences (Nos. 11, 23, 28).

"*A healthy and meaningful space industry is one that is not dependent on government investment. A "blood transfusion" without "blood production" will eventually cause the space industry to lose momentum*." [132]

"*In just five years, China's Commercial Space has evolved from being dominated by traditional space, to gradually injecting social capital, to the current booming development of minying aerospace entreprises, and its business model is constantly adapting to the development of the industry.*"[133]

"*Following the contemporany theories of management and natural monopolies, the State must ensure a flexible managment so as to let new players enter. It has to provide equipment, let go of the guidance, ensure transition from a public operator to a private operator.*" [134]

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[131] Feng, 'Discussing the Construction of China Commercial space Legal System [lun zhongguo shangye hangtian de falv tixi goujian] 论中国商业航天的法律体系构建'. p.8

[132] *s*

[133] Jiayi Zhao, Guanghui Zhou, et Qi'ao)Wei, « The Development Path of China's Commercial Aerospace from the Perspective of Business Model Innovation [shangye moshi chuangxin shijiao xia zhongguo shangye hangtian de fazhan zhi lu]商业模式创新视角下中国商业航天的发展之路 », *Science & Technology for Development* 17, nº 11 (2021): 1951-59. p.1954

[134] Gao Li et Xiaoguang Zhang, « The Influence and Revelation of Deregulation on the US Commerical Space Industry [fangsong guanzhi dui meiguo shangyehangtian fazhan de yingxiang ji qishi] 放松管制对美国商业航天发展的影响及启示 », *Satellite Application*, nº 01 (2015): 58-61. p.58

"*Commercialization is the transformation of all activities that contribute to the development of productivity into goods and services and their exchange, thus supporting by economic means people to engage in productive change and innovation. Through exchange, free capital supports individual division of labor and organizational differentiation, also known as capital spillover. Among these, the optimal integration of adequate factors of production is key, as is space commercialization*."[135]

Space power, National Strategy

Half a dozen authors also frame commercial space as necessary for the PRC to be a space power or for the achievement of other national strategies (Nos. 9, 15, 19, 24, 25, 28)

"*The soundness and innovation of China's commercial space financial model is of great significance to promote the development of commercial space, especially the development of civil-military integration in the space industry*."[136]

"*[CASC] shoulders the mission to builds a strong aerospace nation, to be among strong state nation by 2030 and one of the leading nation by 2045 By 2045, I aim to achieve the goal of becoming a global leader in the space field, surpassing competitors in key areas, occupying the high end of the global space economy industrial chain, and becoming one of the frontrunners in global space development*."[137]

f. *An International Phenomenon*

International Tendancies

Other arguments mobilized to demonstrate the inevitability of the advent of commercial space is it being enshrined in a global tendencies and international competition. Foreign competition is presented as an argument to develop national Commercial space in seven articles (Nos. 2, 5,

[135] Gao et Fu, « New Line of Thought on Commercial Space Development [hangtian shangyehua fazhan de xin siwei] 航天商业化发展的新思维 ».
[136] Shengli Jiang, 'A Brief Discussion on the Soundness and Innovation of Chinese Commercial space Financial Model [zhongguo shangye hangtian jinrong moshi de jianquan yu chuangxin lve lun] 中国商业航天金融模式的健全与创新略论', *Space International*, no. 01 (2019): 42–46. p.42
[137] Yantao Zhang et al., 'CASC Opens Wide Commercial space Door [zhongguo hangtian keji dakai shangye hangtian da men] 中国航天科技打开商业航天大门', *Talents magazine*, no. Z5 (2020): 29.

13, 19, 23, 25, 27) the shrinking of State demand and budget is mentioned in four (Nos. 2, 11, 13, 17).

"*In 2019, the global commercial rocket launch market is expected to continue its fierce competition, with the trend for developed countries to expand their space interests through commercial power, and President Trump officially signing Space Policy Order on the formation of the Space Force.*"[138]

"*At present, countries are competing for space resources, while China's commercial space is still in its initial stage, how to break the current situation to achieve quantitative to qualitative change has become an urgent problem to be solved. However, the success of SpaceX, a global pioneer in commercial space, is not only the result of innovative technology, but also its mature business model, and mere technological innovation is not enough to help the company stand out*."[139]

"*With the rapid development of commercial space and emerging spacefaring nations, the cost and pricing advantages of Chinese space enterprises are gradually diminishing. SpaceX's rocket launch costs are now approaching those of the most affordable models in the Long March series, and its rocket recovery technology is becoming increasingly mature, nearing practical application. Meanwhile, India is making strong progress in small satellite launches, having just set a world record by launching 104 satellites in a single mission. Among them, 88 Dove satellites were secured through competition with Russia, a major space power. In contrast, China's two major aerospace conglomerates owe much of their massive economic scale to domestic military orders, monopoly operations, and non-space-related businesses. Their share in the international space market remains quite limited.*"[140]

The foreign experience to commercial space has a strong presence in the articles of the sample, foreign commercial space experience or enterprises being mentioned in half of them (Nos. 1, 2,

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[138] Yang et Li, « 2019 China Commercial Space Development Prospects [2019 nian zhongguo shangye hangtian fazhan xingshi zhan wang] 2019 年中国商业航天发展形势展望 ». p49

[139] Jiayi Zhao, Guanghui Zhou, et Qi'ao Wei, « The Development Path of China's Commercial Aerospace from the Perspective of Business Model Innovation [shangye moshi chuangxin shijiao xia zhongguo shangye hangtian de fazhan zhi lu]商业模式创新视角下中国商业航天的发展之路 », *Science & Technology for Development* 17, nº 11 (2021): 1951-59. p1951

[140] Liu, 'Mixed Reform, A Window for Commercial space and Space Commercialization [hungai, wei shangye hangtian yu hangtian shangyehua dakaile de yi chuanghu] 混改,为商业航天与航天商业化打开的一扇窗'. p.13

3, 5, 6, 8, 10, 11, 14, 15, 17, 22, 23, 25, 29). Four articles are based on presenting commercial space experiences abroad and applying them to the PRC (Nos. 1, 2, 3, 4).

"*Commercial space refers to space activities that allocate resources such as technology, capital, and talent according to market principles, with the aim of generating profit. In the late 1990s, the term new space [新空间 xin kongjian]*[141] *began to be used in the United States to describe a new generation of space development. Martin defines new space as "the emergence of a different atmosphere, in which existing aerospace approaches and operations are challenged by a more entrepreneurial private sector, adopting more agile methods and making use of the latest commercially available technologies"*[142]".[143].

"*The concept of commercial space has been around for over 30 years, and it has been explored from various perspectives. In the United States, commercial space is defined as: space products, services, or activities provided by enterprises, where these enterprises must bear a certain proportion of investment risk and responsibility. They operate under typical market incentive mechanisms to control costs and maximize returns on investment, and are capable of providing space products and services to current or potential non-government customers.*" [144]

"*While formulating the "Space Law", my country should look at the world, draw on the mature experience of developed countries, and combine with the actual situation of the country to truly ensure that the law will play the greatest role.*"[145]

A Disputed Foreign Inspiration

However, the inspiration to be drawn from foreign experience is also largely subject to discussion, as the question of replicability is raised in twelve texts (Nos. 5, 6, 8, 10, 11, 12, 14, 15, 17, 22, 23, 24).

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[141] Both in mandarin and in English in the text: "新空间 (new space)"

[142] Quoting: Martin Sweeting, "Modern Small Satellites-Changing the Economics of Space," *Proceedings of the IEEE* 106 (March 1, 2018): 343–61, https://doi.org/10.1109/JPROC.2018.2806218.

[143] Zhao, Zhou, and Wei, 'The Development Path of China's Commercial Aerospace from the Perspective of Business Model Innovation [shangye moshi chuangxin shijiao xia zhongguo shangye hangtian de fazhan zhi lu] 商业模式创新视角下中国商业航天的发展之路'. P1951

[144] Wang, 'Study of Commercial space Quality Control Management [shangye hangtian zhiliang guanli yanjiu] 商业航天质量管理研究'. p.54

[145] Feng, « Discussing the Construction of China Commercial Space Legal System [lun zhongguo shangye hangtian de falv tixi goujian] 论中国商业航天的法律体系构建 ». p43

Four authors (Nos. 10, 14, 15, 17) make the claim that abroad, commercial space is equated with the rise of private actors, a framework that is ill-adapted to the Chinese context.

"*The term "commercial space" is directly translated from* commercial space[146]*, and the word "commercial" means private (including enterprise) transactions, trade, doing business. In an environment where state-owned spaceflight companies are largely non-existent abroad, commercial space is distinguished in the United States from private industry, which has traditionally received significant government funding for space activities. In most cases, Commercial space in the U.S. is a term used to encourage the participation of powerful private companies in space affairs. In Japan, it is referred to as "civil space activities". Thus, Commercial space can also be translated as "tradable space activities or matters". As you can see, this is not the basis for splitting up the concept of "civil space" in China."*[147]

Six other articles question the replicability of US commercial space enterprises success stories (Nos. 5, 6, 8, 12, 22, 23).

"*China's commercial space sector has yet to see a private aerospace enterprise achieve a mature and self-sustaining business model. Given China's national context, it is not feasible to fully replicate the closed-loop business model established by SpaceX. Instead, Chinese commercial space enterprises need to forge their own unique path of development.*" [148]

"*Drawing on the commercialization experiences of internationally renowned emerging aerospace enterprises, it remains to be seen whether the vertically integrated full-industry-chain model driven by satellite constellation plans, as adopted by the CAS system's commercial space enterprises, can effectively be transformed into a business closed-loop model centered on integrated solutions for application and user demand*."[149]

"*Digital Earth Corporation, the world's largest commercial remote sensing enterprise, whose primary customer is the US Department of Defense, uses remote sensing images to support US*

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[146] In English in the text

[147] Nian Shen, « Rediscussing "Commercial Space" [zaiyi "shangyehangtian"] 再议"商业航天"», *China Aerospace*, nº 07 (2019): 42-43.

[148] Zhao, Zhou, and Wei, 'The Development Path of China's Commercial Aerospace from the Perspective of Business Model Innovation [shangye moshi chuangxin shijiao xia zhongguo shangye hangtian de fazhan zhi lu] 商业模式创新视角下中国商业航天的发展之路'.

[149] Jianfeng Sun et Min Niu, « Research on Commercial Aerospace Enterprises of the Department of Chinese Academy of Sciences from the Perspective of Industrial Chain [chanyelian shijiao xia zhongguo kexueyuan xi shangye hangtian qiye yanjiu] 产业链视角下中国科学院系商业航天企业研究 », *Aerospace China*, nº 02 (2021): 47-52. p52

military operations around the world. China has no such demand, and naturally cannot copy the US model."[150]

In this subsection, we could remark that the majority of articles in the sample present commercial space activities not only as a positive trend but also one that is inevitable and necessary. Indeed, not all the articles whose formats were listed in section B of this Chapter lend themselves to expressing a value judgment on commercial space activities, for instance, very short press articles or consultancy reports. This uniformity of tone is hence particularly striking and creates the impression of a genuine consensus. However, this consensus holds only insofar as one assumes that all authors are referring to the same concept when they use the term "commercial space", which, upon further analysis, is not the case.

2. *The Crux of Definition: Commercial Space in Contention*

This subsection highlights that the apparent consensus on the benefits of commercial space masks significant divergences in how the concept is defined—whether explicitly or implicitly.

Two authors in the corpus, Shen Nian and Liu Yufei, have explicitly criticized the ambiguity surrounding the notion of *commercial space* in the literature and, more broadly, in sectoral discourse. According to them, this lack of clarity prevents a clear distinction between different types of actors. Moreover, they argue that this definitional vagueness alternately serves the interests of different stakeholders, depending on how the concept is framed.

These definitional divergences crystallize particularly around the role of SOEs on one hand and private enterprises on the other. They also have a chronological dimension: while SOEs have engaged in profit-generating market activities since the 1980s, the entry of private actors is a phenomenon largely confined to the mid-2010s.

a. *An Instrumentalized Uncertainty?*

Two authors, Shen Nian and Liu Yufei, directly shed light on the definitional issue surrounding the concept of *commercial space*, underlying the presence of diverging definition and of possible instrumentalization by some players of the uncertainty it generates.

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[150] Yufei Liu, « The Prospects of China Space Commercialization and Commercial Space [zhongguo hangtainshangyehua yu shangyehangtian de qianjing] 中国航天商业化与商业航天的前景 », *Satellite and Network*, nº 08 (2015): 30-33. p31

Shen and Liu's critiques are useful tools to help us understand and organize the variety of definitions (seven others in total) and more or less elaborate typologies given in the articles composing the sample. These two authors, while holding very different opinions, both highlight the presence of an unclarity in the definition of *commercial space*, and underline possible instrumentalizations of this ambivalence. They help us identify at least two types of enterprises involved in commercial space: SOE and *minying,* or private enterprises. Furthermore, they underline the presence of debates that remain otherwise latent, revolving around their respective role within commercial space.

Extensive research on the concept of *minying* was carried out during the first year of the PhD. It was initially identified as the term used—particularly in local press—to designate some of the launcher companies studied. I then sought to find an official definition from company law in order to clarify the debate surrounding the nature of commercial space enterprises in the English-language literature. However, further research revealed that no such official definition exists. Later, when comparing these findings with fieldwork experience, I realized that the precise definition of *minying* was not a matter of importance for the actors on the ground. I therefore decided not to include the full text of this research in the dissertation, but to provide a brief summary here in order to explain why I chose to retain the term *minying*, which reflects a contested history.

The term *minying*, originally used by Mao Zedong, gained popularity under Jiang Zemin's presidency. Some Chinese sources from that time suggest it was a euphemism meant to avoid the politically sensitive term *private*, which was deemed inappropriate among Chinese political elites. This idea was also echoed in interviews (exchanges nos. 9, 16). A less reliable but nevertheless interesting source—an online forum post—claimed that *minyingization* (*minyinghua*) referred to the privatization of parts of the state economy, particularly at provincial and local levels. These privatizations, which led to waves of layoffs [下岗 *xiagang*], were highly controversial. Thus, *minying* seems to carry more political than legal connotations.

Unlike the term *private* when used to describe the ownership of a company—[*siyou* 私有], which is an official legal term—*minying* [民营 *minying*] refers more to how companies are operated. While *siyou* is contrasted with [国有 *guoyou*] *, minying*, or privately operated, would theoretically be contrasted with *guoying* [国营 *guoying*] —a term I have not encountered in either documentary or field research. A working hypothesis at the time of these exploratory research was that *minying* referred more broadly to enterprises belonging to the market

economy, as opposed to the planned economy—a distinction present in successive versions of the constitution of the PRC.

This research was developed during the pandemic, more precisely during the first lockdown in France, spring 2020. Upon arriving in the field for my research three years later, I quickly realized that these reflections made employees of private companies uncomfortable, puzzled, or bored: as if the issue were entirely outside their realm of concern, belonging more to intellectual construction than to lived reality. Later, when discussing the topic with a law instructor specializing in space affairs in China, I noticed a similar discomfort, even though I had expected interest or familiarity with these categories. This made me realize that it would be best to set aside this initial line of research, as it appeared too far removed from the realities on the ground.

Nonetheless, it seems important to retain the term *minying*. On the one hand, it highlights the limits of what is accessible through Chinese-language research for a foreign researcher. *Minying* lacks an official definition, and it is possibly politically and historically charged. It evokes representations for local actors—representations that would be useful for understanding the phenomenon under investigation: how local actors define *commercial space* and what they see as its core characteristics—but to which I do not have direct access. Keeping the original term thus acts as a signal that the English translation does not fully capture its meaning. On the other hand, although the deeper significance of *minying* may not be entirely accessible to me, the historical and legal explanations explored still enrich our understanding, in particular the contrast with *siyou* which is a strict, corporate legal term, rarely used by stakeholders and experts of the field. Using the term in its original language also helps to highlight this background.

Shen Nian is opposed to use of the "fashionable" term *commercial space,* which he views as the inappropriate application of an American concept to Chinese conditions. He highlights that two types of actors employ the term for very different purposes:

"*Different actors in China's space activities have different understandings of "commercial space". Minying enterprises talk about "commercial space" to break the monopoly of the government industry, squeeze into the government space system, and obtain corresponding policy preferences and investment support. On the other hand, state-owned space enterprises speak of "commercial space" from their own advantages, "facing the main battlefield of the national economy", and "looking for a rice bowl" from commercial operations.*

This is comparable to "entering the city" and "leaving the city" in "The Siege" by Qian Zhongshu. One wants to "get out" and the other wants to "get in", and the two demands are completely different."[151]

One could interpret his paragraph as follows: *minying* enterprises are attempting to integrate into the existing system dominated by SOEs, aiming to benefit from public funding and political support. Meanwhile, SOEs are seeking to diversify their revenue sources by targeting non-State markets. He humorously summarizes his stance by referencing the novel *The Siege*, which likens marriage to a besieged fortress: those outside want to get in, while those inside want to get out. Thus, Shen Nian denounces a sort of fool's game in the public debate on commercial space, underlining that *minying* enterprises on the one hand, SOEs on the other, use of divergent definitions for the same term according to their respective interests. He concludes: "*Therefore, there is no neutral and accurate definition of "commercial space" so far*."

Later in the article, Shen Nian depicts an effective competition between these two types of actors for limited resources: orbits; launch center; qualified manpower and pronounces himself mostly in disfavor of the *minying* companies.

In her article *Mixed Reform, an Open Window for Commercial space and Space Commercialization?*, Liu Yufei, makes a similar observation on the misuse of the term *commercial space*:

"*In order to raise enough alarm, : some enterprises engaging in "commercial space" under the current system are essentially establishing traditional-style companies; in essence, they are not truly commercial enterprises in the strict sense. Fundamentally, they are not truly commercial enterprises in the strict sense. The creation of such "commercial space companies" is, at best, an attempt to commercialize traditional space activities, which the market refers to as "old wine in a new bottle"*[换汤不换药 *huan tang bu huan yao,* litteraly *changing the soup without changing the medicine*]*." Based on our observations of these enterprises, we also find that they do not conform to the basic principles of "commercial" activity*."[152]

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[151] Nian Shen, 'Rediscussing "Commercial space" [zaiyi "shangyehangtian"] 再议"商业航天"', *China Aerospace*, no. 07 (2019): 42–43. p.42

[152] Liu, 'Mixed Reform, A Window for Commercial space and Space Commercialization [hungai, wei shangye hangtian yu hangtian shangyehua dakaile de yi chuanghu] 混改,为商业航天与航天商业化打开的一扇窗'. p.14

What Liu Yufei describes in this quotation is the creation of new enterprises, likely spin-offs from state-owned companies, which, while benefiting from state funding and contracts, portray themselves as commercial enterprises. She challenges the novelty of this form of enterprise and its legitimacy in being labeled as *commercial space*, favoring instead the term *space commercialization*.

To understand this critique, we must first delve into Liu Yufei's definitions of *space commercialization* and *commercial space*, which are situated within a broader diversity of definitions present in the various articles of the sample.

b. *Various Definitions*

Liu Yufei: Making a Distinction Between Space Commercialization and Commercial Space

In an article titled *The Concepts of Space Commercialization and Commercial space*, Liu Yufei makes a distinction between *space commercialization* [航天商业化 *hangtian shangye hua]* and *commercial space* [商业航天 *shangye hangtian*]. This distinction is presented as follows:

"*In practice, space commercialization refers to the opening of space infrastructure that originally served only the government, military, and national security needs to the commercial market, and space manufacturing enterprises and space system operating enterprises that originally served only the government seeking contracts in the commercial market, while the government and military enter the market as major customers and conduct bidding and procurement according to commercial laws. Commercial space is a completely different concept, which refers to the formation of new space enterprises according to a market-based model, engaging in investment and financing, acquisition, merger, spin-off, bidding, bargaining, compensation, R&D, collaboration, manufacturing, and operations according to market-based rules, with investors and enterprises being free to enter and exit."*[153]

In the continuation of the article, devoted to the history of these phenomena abroad, she underlines that the chronology is not the same, *space commercialization* being an older phenomenon, already at a very advanced phase, particularly at the international level. She ends with the case of the PRC, where space commercialization "already has some material base" in

[153] Yufei Liu, 'The Concepts of Space Commercialization and of Commercial space 航天商业化与商业航天的概念 [hangtian shangyehua yu shangyehangtian de gainian]', *Satellite and Network*, no. 08 (2015): 22–24. p.22

telecommunications, high-resolution remote sensing, and Beidou navigation, while *commercial space* is facing many difficulties.

Liu makes a clear distinction between *space commercialization*, which she defines as the adaptation of state-owned infrastructure and enterprises to market demands, and *commercial space*, characterized by the creation of new enterprises operating according to market rules. Importantly, Liu does not assert that *commercial space* enterprises are necessarily *minying* enterprises or independent start ups; rather, she seems to focus on spin-offs from state-owned enterprises. However, Liu critiques these spin-offs for not genuinely adhering to market principles. In her view, they represent the "old wine" of space commercialization, superficially repackaged rather than fundamentally transformed.

Liu Yufei makes a chronological distinction between an older trend of *space commercialization*, which involves the entry of state-owned enterprises into the international market for launch services, and a more recent wave of commercial space. This distinction is echoed in other texts within the sample while the authors do not necessarily draw the same distinction between *space commercialization* and *commercial space*.

"*In fact, China's state-owned aerospace enterprises and other operators of state-owned aerospace assets have long been attempting to commercialize aerospace. Offering satellite launch services to international clients can be considered one of the earliest efforts. This gradually evolved into exporting entire satellites and related services. Pursuing commercialization through foreign trade activities has almost become an inevitable path for every large state-owned military-industrial enterprise seeking commercialization. The international market, clearly governed by commercial rules, has indeed taught these enterprises many operational methods and principles of commercialization during their endeavors. However, this has had little impact on the commercialization of the domestic aerospace market. The main reason is that domestic user groups, such as the government and military, have been artificially set to operate outside market mechanisms, leaving no room for aerospace commercialization to develop.*" [154]

"*At the national level, in 1985, the Ministry of Aerospace Industry announced that 'Long March rockets would engage in commercial launch activities,' marking China's first attempt to focus*

[154] Yufei Liu, 'The Worries of China Space Commercialization and Commercial space [zhongguo hangtian shangyehua yu shangyehangtian de youxin] 中国航天商业化与商业航天的忧心', *Satellite and Network*, no. 08 (2015): 26–28. p.27

on the field of commercial space. It wasn't until 1990, when a Long March 3 rocket successfully launched AsiaSat-1 into its designated orbit, that China took a solid first step into commercial space. Although China's commercial space efforts have been steady, they started relatively late and still lag significantly behind the major spacefaring nations. The commercialization of space has been hindered by traditional models, with state-owned enterprises largely maintaining monopolistic behaviors. […] On the private capital level, driven by state policy support and the allure of the international commercial space market, Chinese commercial space startups have sprung up like bamboo shoots after a spring rain since 2014."[155]

"*My country's earliest commercial space activities began in the early 1980s. Subsequently, with international commercial launches as a breakthrough, it once occupied 7% to 9% of the global commercial launch market. In recent years, a series of landmark achievements have also been made in the export of entire satellites. However, overall, my country's commercial space activities are primarily aimed at international customers, while the development of the domestic commercial space industry has been seriously lagging behind."*[156]

The distinction Liu makes between *space commercialization* and *commercial space*, as evoked in the Introduction, is relevant for a clearer understanding of the issue. Liu Yufei is the most prolific and arguably specialized author on the topic according to research conducted in Chapter I, and her definition is the only one quoted by other authors in the corpus. Hence, in this dissertation, a distinction is made between *space commercialization* and *commercial space* for purpose of clarity.

Jiang; Zhao Zhou and Wei : Broad and Narrow Understanding of Commercial Space

In the articles analyzed, the authors presented below do not differentiate between *space commercialization* and *commercial space*. Instead, they distinguish between a broad and a narrow conception of *commercial space*—a distinction that largely overlaps with the earlier framework proposed by Liu Yufei who is quoted in one of them. This is evidenced in their use of similar or even identical phrasing to that employed by Liu when describing *space*

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[155] Yuanyuan Liu et Xiaojin Zhang, « The development and the Legal and Regulatory System of Space Commercialization [hangtian shangyehua jiqi falv guizhi] 航天商业化发展及其法律规制 », *Global Market Information Guide* 22 (2018). p20

[156] Feng, 'Discussing the Construction of China Commercial space Legal System [lun zhongguo shangye hangtian de falv tixi goujian] 论中国商业航天的法律体系构建'. p.9

commercialization and *commercial space*, respectively, which they then apply to articulate the broad and narrow understandings of *commercial space*.

Jiang Shengli distinguishes between a "broader understanding" of *commercial space*, led by state-owned enterprises, and a "restricted sense" of *commercial space*, confined to private [*siying*] enterprises, thereby excluding SOE spin-offs.

"*From a conceptual perspective, "commercial space" can be divided into broad and narrow definitions: the broad definition of "commercial space" typically involves state-owned space enterprises as the main actors. These enterprises, which previously provided services exclusively to national governments and the military […], begin offering services to the commercial market and repurposing space facilities and products formerly limited to governmental and military use for commercial purposes. At the same time, governments and the military, acting as "clients," enter the commercial market and conduct bidding and procurement for the space activities they require. Due to its distinctive characteristic of transitioning from "nationalization" to "commercialization," the broad definition of "commercial space" is often also referred to as "space commercialization."*

In contrast, the narrow definition of "commercial space" generally involves private [*siying*] *space enterprises established according to market-oriented principles. These enterprises are characterized by private investment, private construction, private operation, and private profit, forming a private-sector model. Specifically, private space enterprises engage in activities such as investment and financing, bidding, research and development, manufacturing, operations, and partnership, all conducted in accordance with market rules to carry out various commercial space activities. Compared to the broad definition of "commercial space," the narrow definition emphasizes "privatization" alongside "commercialization," meaning that the activities are largely carried out by private space enterprises independent of state-owned space enterprises.*"[157]

While Jiang explicitly draws parallels between these distinctions and those made by other authors between *space commercialization* and *commercial space*, he argues that these two tendencies should be considered collectively. Moreover, Jiang contends that the broader

[157] Jiang, 'A Brief Discussion on the Soundness and Innovation of Chinese Commercial space Financial Model [zhongguo shangye hangtian jinrong moshi de jianquan yu chuangxin lve lun] 中国商业航天金融模式的健全与创新略论'. pp42-43

understanding of *commercial space*, essentially *space commercialization* in the understanding of Liu Yufei, being led by SOEs in the current phase is a positive development.

"*In response to the above-mentioned distinction between the broad and the narrow sense of the concept of "commercial space", the view was expressed that "Space Commercialization" and "commercial space" should be two distinct concepts, and that only the narrow sense of "commercial space" should be used. It has been argued that "space commercialization" and "commercial space" should be two distinct concepts, and that only the narrow sense of "commercial space" can constitute "commercial space" in the true sense. However, in my opinion, it is precisely the above-mentioned broad and narrow meanings of "commercial space" that together constitute the complete connotation of commercial space; at the same time, China's commercial space is at the stage of development led by "space commercialization", and the national space enterprises are the main ones carrying out commercial space activities. At the same time, China's commercial space is at the stage of "space commercialization"-led development, and commercial space activities are carried out mainly by national space enterprises, which is the essential characteristic of Chinese commercial space*."[158]

As we saw in Chapter I, Jiang Shengli is a professor of law at the East China University of Political Science and Law. Therefore, his defense of a commercial space sector that includes state-owned enterprises—currently in a leading role—alongside private firms working in coordination, is not, in his case, the expression of a corporatist stance aligned with CASC. One may hypothesize that this approach reflects a broader political view on the role that the state-owned economy should play in relation to private enterprises and capital in the space sector. Liu Yufei, for instance, defends a reformist or liberal position that advocates for granting greater importance to private capital within a deep reform of state-owned enterprises; Shen Nian, by contrast, adopts a conservative perspective, defending the hegemony of state-owned enterprises; while Jiang Shengli holds a middle-ground position while slightly more favorable to state-owned firms.

Zhao Jiayi, Zhou Guanghui and Wei Qi'ao also make a distinction between a broad meaning of *commercial space* dominated by SOE and a restricted meaning in the hands of private (*siying*) enterprises, making direct reference to Jiang Shengli's work. The authors hold the view that

[158] Shengli Jiang, "A Brief Analysis on the Soundness and Innovation of Chinese Commercial Space Financial Model [zhongguo shangye hangtian jinrong moshi de jianquan yu chuangxin lve lun] 中国商业航天金融模式的健全与创新略论," *Space International*, no. 01 (2019): 42–46. p.43

commercial space is transitioning from the former to the latter, which is not without reminding the "stage of development" evoked in Jiang's article. They place the starting point of this tendency in 2015 with the successful launch of Jilin-1 presented as the first commercial high-definition remote sensing satellite. They consider *commercial space* as involving *minying* enterprises, either in contractual cooperation with traditional space enterprises or individually, which is an original approach. These authors are also scholars, as they work in affiliate laboratories of the Chinese Academy of Sciences (CAS).

"*Current understanding of commercial space into broad and narrow concepts, with "commercial space" in the broad sense usually being dominated by traditional national spaceflight, and "commercial space" in the narrow sense generally being implemented by private [siyin] space enterprises established under market-based rules. The specific implementation method is for private space enterprises to engage in bidding, investment and financing, research and development through market-oriented rules.*

In the narrow sense, the main body of "commercial space" is generally a private (siying) space enterprise established according to market-oriented rules, and the specific implementation method is that private space enterprises engage in production and operation such as bidding, investment and financing, research and development, manufacturing, operation and cooperation, etc. through market-oriented laws, and carry out various commercial space activities[159]*. It can be seen that the narrow concept of "commercial space" is more a function of private [siying] space enterprises independent of national space enterprises to carry out commercial space activities. This paper argues that commercial space activities represent an intermediate stage in the transition from a broad to a narrow definition, encompassing both contractual collaborations between traditional space actors and private space enterprises, as well as independent commercial space activities conducted by private companie* [160].

The article by Zhao Zhou and Wei also makes a typology of enterprises based on their business model. One, civil military integration model for which they take ExPace as an example later developed into a case study. The authors mention that *minying* enterprises can also adopt a CMI model on a specific project, taking iSpace "independently developing and manufacturing" their

[159] Quoting: Jiang Shengli, "A Brief Analysis of the Practice and Problems of Investment in China's Commercial Space [中国商业航天投资的实践与问题简析 Zhongguo Shangye Hangtian Touzi de Shijian Yu Wenti Jianxi]," *Space International*, no. 7 (2019): 53–56.

[160] Zhao, Zhou, and Wei, 'The Development Path of China's Commercial Aerospace from the Perspective of Business Model Innovation [shangye moshi chuangxin shijiao xia zhongguo shangye hangtian de fazhan zhi lu] 商业模式创新视角下中国商业航天的发展之路'. P1951

rocket Hyperbola 1 before launching it at Jiuquan national center as an example[161]. Two, local industrial chain model for which they mention, iSpace, Spacety, GalaxySpace, and make a case study of iSpace. Three, integrated closed model for which they take the example of SpaceX and hold there is no equivalent in China.

The two excerpts presented above already underline a diversity among definitions presented in the sample, and how they are articulated with specific points of view on the respecting roles of SOE and private enterprises. Whereas Liu Yufei makes a strict distinction between *space commercialization* and *commercial space*, Jiang, and Zhao Zhou and Wei consider this respectively a broader and a narrow definition of one phenomenon. The former author advocates a stronger role for SOEs, whereas the latter underline the role of private enterprise.

Wang; Zhao and Zhang; Feng: Making a Distinction Between Enterprises Types, Commercialization and Privatization

In the following articles, the authors, while not making distinction within the concept of *commercial space*, underline the difference between types of enterprises. These can also be paralleled with the distinctions made in the articles mentioned in the previous subsection.

Wang Xianyu, although making no difference between *space commercialization* and *commercial space*, distinguishes between *traditional enterprises* and *new enterprises* in the same lines as those of the previously presented authors, while making reference to Liu Yufei's work. This example illustrates the diversity of semantic choices and the risk of confusion it entails.

"*The primary entities in commercial space are enterprises, while the government, social organizations, individuals, and other businesses can all serve as users of commercial space. In addition, there are regulations, policies, and mechanisms associated with the operation of commercial space. Therefore, commercial space can be defined as the formation of supply and demand relationships for space products according to market rules, product development, launch services, and after-sales support, as well as the establishment of related regulations, policies, and operational mechanisms*.[162]

[161] Zhao, Zhou, and Wei. p1954
[162] This paragraph ends with a footnote to Liu Yufei's 2015 article.

In the development of commercial space, on the one hand, traditional space enterprises are transformed into commercial enterprises, i.e., space manufacturing enterprises and space system operation enterprises originally serving only the government seek contracts in the commercial market, and space infrastructure facilities originally serving only the government, military, and national security needs are opened to the commercial market, while the government and military enter the market as major customers, bidding and purchasing from multiple products and service providers according to commercial rules. On the other hand, new aerospace enterprises are formed in accordance with the market-oriented model to engage in investment and financing, acquisition, merger and acquisition, manufacturing, operation and other activities, and investors and enterprises are free to enter and exit.[163]" [164]

Later in his article, Wang's also makes a typology of different types of new commercial space enterprises. The first category is enterprises with a traditional background that made a transition towards commercialization [商业化转型 *shangyehua zhuanxing*] —a term that is also used by Liu yufei—, such as Long March and ExPace. The second is *minying* enterprises without a background in space products development and production in a market fashion OneSpace, LandSpace, Spacety etc.[165] Wang's definition thus includes only the commercial spin-offs of state-owned enterprises within the category of commercial enterprises, excluding their parent companies.

Without explicitly taking sides between SOE-backed spin offs and private enterprises, he nevertheless expresses support for the latter. This position is all the more interesting given that he is identified in the article as an employee of CASC. This provides support for nuancing the hypothesis of discursive dominance formulated in Chapter I: namely, that an author's affiliation with CASC does not necessarily imply an endorsement of a hegemonic position in favor of state-owned enterprises.

The text in question is classified as an academic research article according to the typology established in Part B of this chapter. This is also the case for the texts discussed in the previous subsection (Jiang; Zhao Zhou and Wei: broad and narrow understandings of *commercial space*). With the exception of Wang Xianyu, whose precise affiliation with CASC is not identified, all

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[163] Quoting: Liu, "The Concepts of Space Commercialization and of Commercial Space 航天商业化与商业航天的概念 [hangtian shangyehua yu shangyehangtian de gainian]."
[164] Wang, 'Study of Commercial space Quality Control Management [shangye hangtian zhiliang guanli yanjiu] 商业航天质量管理研究'. p.54
[165] WANG. pp.55-56

of the authors in these two subsections are affiliated with universities or research laboratories, which may lead them to seek more precise and critically framed definitions of the terms they employ. This sets them apart from the majority of articles in the corpus, which generally do not offer such clarifications.

Zhao Haifeng and Zhang Zhao do not make a distinction between *space commercialization* and *commercial space* either, but *commercialization* and *privatization*. The definition of Zhao and Zhang mentions profit-making. Later in the article, the authors precise that leaders of space commercialization are still SOE, which continued role in the industry they advocate, and present ExPace as a new initiative on a commercial model. However, the authors also advocate against excessive restrictions on private enterprises.

"*Space commercialization refers to activities aimed at developing and utilizing outer space for profit, such as providing space launches, communications, remote sensing, or other space services, as well as developing space products and resources. Simply put, it is the gradual transformation of aerospace from a "public undertaking" to an "industry," shifting from sole reliance on state funding without regard for profit to achieving a certain degree of self-sufficiency and even self-reliance.*

[…] The main actors in commercialization can be divided into two categories: one includes governments and international organizations, and the other comprises non-governmental entities, primarily private enterprises. In countries with well-developed space commercialization, private enterprises are widely involved in space activities. On the one hand, they provide services and products for national space programs and projects, and on the other hand, some strong enterprises directly engage in activities such as satellite manufacturing. [166]

Feng Guodong is critical of the "narrow" definition of *commercial space* and makes a distinction between *government space projects* and *commercial space*. He also criticizes the equating of *commercial aerospace* with *private aerospace*, which he says ignores the nature of commercial space under China's national conditions.

In his opinion, the real difference between *commercial space* and *governmental space* lies with the origin of the funds and the presence of market mechanisms. He does not explicitly take

[166] Haifeng Zhao and Chao Zhang, 'Study on the Commercialization and Legislation of China Aerospace [zhongguo hangtian shangyehua ji falv zhengce de yanjiu] 中国航天商业化及法律政策问题研究', *Space International*, no. 10 (2017): 52–57. p.52

sides, emphasizing instead that both should complement each other. However, it remains unclear whether, for Feng, SOE spin-offs fall under commercial or governmental space. As highlighted in Liu Yufei's discussion, the question of whether their funding is public or private is not straightforward. This issue is examined in detail in Part 4 of this dissertation, drawing on quantitative sources on the capital structure of major commercial launch vehicle enterprises.

"*The primary difference is that commercial space does not rely on government financial funds, with funding sources being market-oriented. Secondly, the goal of commercial space is to achieve profitability after deducting costs, whereas government aerospace projects aim to provide public service products or conduct fundamental scientific research.*

Furthermore, commercial space projects follow market-oriented operational mechanisms.[…] In contrast, government aerospace projects are often constrained by government financial, decision-making, and management systems, following a planned operational and development mechanism.

Therefore, the demand side of commercial space is not various government agencies but highly commercialized economic entities. On the supply side, it can include state-owned aerospace industry sectors or private aerospace enterprises. As long as they can meet market demands and provide suitable aerospace products, all enterprises and institutions are potential suppliers for commercial space."[167]

Thus, the definition provided by Feng Guodong lacks clarity. He emphasizes the inadequacy of using the term "privatization" to describe commercial space activities in the Chinese context. These elements are consistent with the hypothesis of a corporate positioning aligned with the interests of CASC — specifically, the deliberate maintenance of ambiguity in the notion of *commercial space*, which would leave room for SOEs. Indeed, Feng Guodong is an employee of SAST, which operates under the authority of CASC.

Li and Zhang; Gao and Fu : Identifying Only One Tendency

Among the authors giving a definition, two do not make any form of distinction between *space commercialization* and *commercial space*, focusing on the profit-making aspect of *commercial*

[167] Feng, 'Discussing the Construction of China Commercial space Legal System [lun zhongguo shangye hangtian de falv tixi goujian] 论中国商业航天的法律体系构建'. p.9

space. That is the case of Li Yuanyuan and Zhang Xiaojin, both workers of Chinese Academy of Social Sciences, Institute of Industrial Economics:

"*The commercialization of space technology refers to the commercial activity of using outer space to provide satellite launch, communication, remote sensing or other space services and space product resources in return for a certain amount of money*."[168]

Gao Hongqiang and Fu Bin, whose affiliation are not disclosed in the article, also insist on the economic dimension of commercialization in general in positive terms, before applying it to the case of space:

"Commercialization refers to the process of transforming all activities conducive to the development of productive forces into goods and services for exchange, thereby using economic means to support reform and innovation beneficial to production. Through exchange, free capital can support individual specialization and organizational differentiation — a process also referred to as capital spillover. The key lies in the optimal integration of production factors, and this applies equally to the commercialization of space."[169]

Other Typologies of Enterprises Without Definitions

A majority of articles do not give a clear definition of *commercial space* as such. Yet some of their authors do identify different types of enterprises, in several cases in a fashion comparable to what is presented in the above subsections. When it is the case, they sometimes also take position for the defense of one or the other type of enterprises: traditional SOE, spin off of SOE or independent enterprises.

As we have seen in the above subsection *A different chronology*, in the article of Liu Yuanyuan and Zhang Xiaojin, space commercialization is put in an historical perspective with two types of enterprises appearing successively, first "at the State level", second "at the private capital level".

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[168] Li and Zhang, 'The Influence and Revelation of Deregulation on the US Commerical Space Industry [fangsong guanzhi dui meiguo shangyehangtian fazhan de yingxiang ji qishi] 放松管制对美国商业航天发展的影响及启示'. p.58

[169] Hongqiang Gao and Bin Fu, "New Line of Thought on Commercial Space Development [hangtian shangyehua fazhan de xin siwei] 航天商业化发展的新思维," *Satellite and Network*, no. 03 (2016): 38–43.p.38

"*At the national level, in 1985, the Ministry of Space Industry announced that "Long March rockets will be engaged in commercial launch activities", which was the first time China set its sights on the commercial space sector. It wasn't until 1990, when a Long March 3 rocket successfully launched AsiaSat-1 into its designated orbit […]*

At the private capital level, China's commercial space startups have sprung up since 2014, supported by national policies and attracted by the international commercial space market: LinkSpace was founded in July 2014, Guangdong Kechuang Space Technolog was founded in July 2014, Commsat was founded in June 2015, Landspace was founded in June 2015, OneSpace was founded in August 2015, and Spacety was founded in January 2016. The main businesses of these companies are broadly divided into two categories: satellite manufacturing and operation, and rocket development and launch."[170]

The article by Yang Shaoxiang and Li Hongwei first makes a distinction between *national team* and *minying* enterprises. In the launch sector, a sub-typology is then made between the *minying* launch enterprises that already have performed a launch, and other enterprises, presented as less mature.[171]

Liu, Tang, and Rao describe the arrival of a number of enterprises in Chinese commercial launch services following the model of the private *siying* enterprise SpaceX, including not only traditional space enterprises but also *minying* enterprises including OneSpace.[172]

Gao Guozhu insists that commercial space in China differs from the one in the US and Europe due to a strong presence of SOEs, that are not only tendering national programs but also conducting some independent, for-profit activities. On the other hand, *minying* enterprise attempt with difficulty to enter the space sector.

"*China's space activities are affected by the management system and ownership system, and do not have the same connotation as what the United States and Europe call commercial space activities. In the United States, there are no state-owned enterprises in the space sector, and*

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[170] Liu and Zhang, 'The Development and the Legal and Regulatory System of Space Commercialization [Hangtian Shangyehua Jiqi Falv Guizhi] 航天商业化发展及其法律规制'. p.20

[171] Shaoxian Yang and Hongwei Li, '2019 China Commercial space Development Prospects [2019 nian zhongguo shangye hangtian fazhan xingshi zhan wang] 2019 年中国商业航天发展形势展望', *Satelllite Application*, no. 04 (2019): 48–53.

[172] Liu, Tang, and Rao, "Thoughts On the Regulation of Development of Commercial Space Launchers in China [guanyu guifan woguo shangye hangtian yunzai huojian fazhan de sikao] 关于规范我国商业航天运载火箭发展的思考."

NASA is a federal government agency dedicated to the advancement of aerospace activities. Therefore, there are only two levels, state and private[*私人 siren*]*. There are two sides of the same coin: government research and development (without regard to revenue, mainly civilian) and procurement (including military procurement) and private participation in the space industry (commercial spaceflight) to profit from it. Europe has a small number of state-owned enterprises for historical reasons, and therefore advocates fair participation and reasonable benefits, and its commercial spaceflight is based on profitability*."[173]

Tong Xionghui and Wang Baozhu note the rise of both *minying* enterprises and enterprises with a SOE background in Chinese commercial space in the past few years. They elaborate further stating that the participation of the former kind is not deep and encourages their integration. [174]

"*For a long time, China's aerospace industry has been dominated by the state, with little participation from private enterprises. The latter mainly act as suppliers of raw materials and components, with few system-level and almost no machine-level components. This is not in line with the development trend of the aerospace industry in the world today, nor can it fully meet the needs of the rapid and diversified development of domestic commercial spaceflight in the future*."

Harebottle and Shen's article make a difference between *enterprises affiliated with CASC and SOEs* at large on the one hand and *commercial space* enterprise identified as private enterprises. It provides an approach unique within the articles of the corpus which we can hint is influenced by the presence of an American co-author. CASC is presented with the English acronym, which is not the case anywhere else (including in articles identified as CASC promotional documents). Also, the *Guiding Opinions* of 2016 is dubbed "Document 60", which while common in English-language literature is never the case in the other articles of the sample.

"*Throughout its history, Chinese aerospace has been closely associated with the state, and CASC has become synonymous with China's aerospace industry. Due to CASC's status as a state-owned enterprise, the state-owned nature of the entire Chinese aerospace sector has been quite evident.*

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[173] Gao, 'An Analysis of the Domestic Legal Situation Based upon the Legislation of China's Space Law [woguo hangtian fali fasuo yituo de guonei falv huanjing fenxi] 我国航天法立法所依托的国内法律环境分析'. p.77
[174] Xionghui Tong and Baozhu Wang, 'Risk Study of China's Commercial space Development [woguo shangye hangtian fazhan fengxian yanjiu] 我国商业航天发展风险研究', *Aerospace China*, no. 06 (2018): 28–30. p.30

However, this situation changed significantly with the issuance of Document No. 60 by the Chinese government in 2014, which allowed for increased private investment freedom in technologies such as launch and satellite manufacturing. According to Euroconsult's recently released "China Space Industry 2020" report, over the past six years, more than 100 commercial space companies have been established in China, collectively raising over $1.4 billion (10 billion RMB) in funding during this period."[175]

Articles with Typologies Based on Different Criteria

Sun Jianfeng and Niu Min wrote three articles in the sample for FutureSpace Research Institute, where they operate as senior consultants. The reports list commercial space companies, benchmark them and classify them according to various criteria. Each of the three articles give different typologies of commercial space enterprises. However, the authors do not make a distinction between two types of enterprises as SOE spin off and private start ups, but use other criteria.

In a report titled *Research on the Economic Development of China's Top 30 Commercial Aerospace Enterprises*, the authors present a list of 30 enterprises ranked according to a calculation based on: core technologies; commercial value; innovative capabilities; capital capabilities. A summary table gives information notably on the date of creation, the geographical location, the sector of activity which are the object of an analysis. The rest of the article gives an economic analysis of the commercial enterprises grouped by sector[176]. This typology does not differentiate between SOE spin-offs and independent *minying* companies, as ExPace is included in the index.

A second article titled *Research on Commercial Aerospace Enterprises of the Department of Chinese Academy of Sciences from the Perspective of Industrial Chain* analyzes of China Academy of Science commercial enterprises. Even though there is no definition provided in the article, the implicit assumption that it makes is that enterprises incubated or invested by a state

[175] Adrienne Harebottle and Yongyan Shen, '2020: a Turning Point for Chinese commercial space [2020 nian: zhongguo shangye hangtian de zhuanzhe dian] 2020 年：中国商业航天的转折点', *Satellite and Network*, no. 08 (2020): 34–36. p.34

[176] Sun Jianfeng and Niu Min, 'Research on the Economic Development of China's Top 30 Commercial Aerospace Enterprises[zhongguo shangye hangtian 30 qiang qiye jingji fazhan yanjiu]中国商业航天 30 强企业经济发展研究'.

laboratory can be commercial space enterprises. Two main types of entreprises are presented: those directly invested by CAS system unit, those invested by CAS system funds. [177]

One article of Zuo Jian, the specialized journalist working for the technology-related media 36kr focuses on the diversity of commercial space enterprises organized among sectors. First, concerning space launch enterprises, he distinguishes two types: solid and liquid. In the second case, he names a number of enterprises working on the development of reusable rockets on the one hand iSpace, Deep Blue Space, Galactic Energy. Zuo also mentions some enterprises manufacturing medium and large rocket Landspace and Galactic Energy. [178] Second, concerning satellite internet, he distinguishes four industry links: satellite manufacturing, satellite launch, ground equipment and satellite operations and services. He mentions Emposat and ChinAerospace as being engaged in ground control and operation links[179]. Third, Zuo mentions remote sensing as a field, naming AdaSpace.

c. *Articles Without Definition or Typology: Oversight, Disinterest, Voluntary Omission*

Although a majority of authors in the sample makes a form of distinction between two trends within the concept of *commercial space* and types of enterprises, either via definition, typology or both, some do not make such a distinction. From the broader content and context of the articles, the absence in the sample of a definition and typology can fall into three different categories.

A number of articles make no typology allowing to distinguish, among commercial space enterprises, those having an SOE background and private enterprises (Nos. 14, 19, 21, 22, 24, 26, 29, 30).

The absence of such clarification could be explained by several factors. One, such a definition or typology is unfit for the format and/or not relevant for the topic of the article. As we have seen above, some of the authors criticized too strong of a dichotomy between *space commercialization* versus *commercial space* or a *broad* and a *narrow definition of commercial space*, other authors provided typologies that did not revolve around it, building categories of enterprises among other criteria. In some cases, the absence of a typology or definition may

[177] Sun and Niu, 'Research on Commercial Aerospace Enterprises of the Department of Chinese Academy of Sciences from the Perspective of Industrial Chain [chanyelian shijiao xia zhongguo kexueyuan xi shangye hangtian qiye yanjiu] 产业链视角下中国科学院系商业航天企业研究'.
[178] Zuo, '中国商业航天'. p.27
[179] Zuo. p.28

stem from the same underlying reason as the alternative configurations discussed earlier: a perception that the dichotomy between SOE-led *space commercialization* and *commercial space* driven by independent enterprises is not fundamentally significant.

Examples where the absence of definition and typology could be explained by the format include a report by Sun and Niu *2021 Chinese commercial space industry's progress*, which is a yearly review of Chinese commercial space activities for 2021[180]. Zhang Jingnan's article *Viewpoint About Four Industry Directions of Commercial Space* consists is a conference whose speakers mix entrepreneurs from spin-off companies and entrepreneurs of private enterprises[181].

Examples where the absence of definition and typology can be explained by the lack of relevance to the topic could include the report of Sun and Niu *Research on Commercial Aerospace Enterprises of the Department of Chinese Academy of Sciences from the Perspective of Industrial Chain*[182], which is focused on CAS system enterprises involved in the space industry. Even though the article does make a typology among different enterprises based on corporate nature and investment mode of CAS in it, it does not mention other types of enterprises, which could be considered as beyond the scope of the article.

In the same fashion, Zuo Jian's article *Guoke Jiahe: Multi-link layout of satellite manufacturing and satellite applications*[183] only focuses on one venture fund, Guoke jiahe, which is a State-Owned firm but functions as venture capital. The articles of Zuo Jian being short format —and already presenting a high level of organization and specificity— it is also not surprising they do not engage in debate about the *commercial space* as a concept and the nature of enterprises.

On the other hand, *Thoughts on the Regulation of Development of Commercial Space Launchers in China* by Liu Tang et Rao[184] seemingly focuses only on "new" *commercial space*

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[180] Sun and Niu, '2021 Chinese commercial space industry's progress [2021 nian zhongguo shangye hangtian changye jinzhan] 2021 年中国商业航天产业进展'.
[181] Zhang, 'Viewpoint About Four Industry Directions of Commercial space [shangyehangtian sida chanye fangmian shendu guandian] 商业航天四大产业方面深度观点'.
[182] Sun and Niu, 'Research on Commercial Aerospace Enterprises of the Department of Chinese Academy of Sciences from the Perspective of Industrial Chain [chanyelian shijiao xia zhongguo kexueyuan xi shangye hangtian qiye yanjiu] 产业链视角下中国科学院系商业航天企业研究'.
[183] Jian Zuo, 'Guoke Jiahe: Multi-Link Layout of Satellite Manufacturing and Satellite Applications [guoke jiahe duo huanjie buju weixing zhizuo yu weixing yinyong] 国科嘉和:多环节布局卫星制造与卫星应用', *Satellite Application*, no. 05 (2021): 26.
[184] Xiao Liu, Yagang Tang, et Chenglong Rao, « Thoughts On the Regulation of Development of Commercial Space Launchers in China [guanyu guifan woguo shangye hangtian yunzai huojian fazhan de sikao] 关于规范我国商业航天运载火箭发展的思考 », *Aerospace Industry Management*, nº 02 (2018): 41-43.

enterprises. that is largely explained by the larger context of the article which consists in policy advice on how to frame the activities on new entrants so as to minimize various risks.

Gao and Fu's article *New Line of Thought on Commercial Space Development*[185], focuses on the presentation of a business model for IoT in marine communication. It is hinted that in the eyes of the authors, the nature of the company that would come to apply this business model is not relevant, an impression that is reinforced by the tone of the article and its technical nature.

In this respect, the absence of distinction between different types of companies in certain articles may also stem from a lack of knowledge on the subject, sometimes coupled with relatively low editorial quality. The lack of definition and typology could reflect the uncertainty of the authors themselves about the concept and the nature of commercial space enterprises. Some publications show a low level of research and specificity.

As demonstrated earlier, the topic of commercial space has been an editorial "trend" in the late 2010s which could result in the presence of opportunistic articles in our selection. For example, the article by Li and Zhang *The Influence and Revelation of Deregulation on the US Commerical Space Industry*[186], does not define nor establish a typology for commercial space, and presents a word-for-word plagiarism of the article *The European Space Industry and the Enlightenment*[187] by Liu and An of which there is no mention in the footnote.

Finally, an uncertainty could be created by design in the absence of definition and typology, as a tool for traditional enterprises to highlight themselves and advance their own agendas, as suggested in the critiques of Shen Nian and Liu Yufei. For example, in the article of Yang Baohua can be qualified as a promotional document for the State-owned Conglomerate CASC.

"*In recent years, China has made a lot of achievements in spaceflight, but the leading players in the field of spaceflight commercialization are all state-owned enterprises. China Great Wall Industry Group Corporation (CGWIC), established in 1980, is the main channel for foreign trade and economic cooperation in China's space industry, and the only company approved to*

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[185] Gao and Fu, 'New Line of Thought on Commercial space Development [hangtian shangyehua fazhan de xin siwei] 航天商业化发展的新思维'.

[186] Li et Zhang, « The Influence and Revelation of Deregulation on the US Commerical Space Industry [fangsong guanzhi dui meiguo shangyehangtian fazhan de yingxiang ji qishi] 放松管制对美国商业航天发展的影响及启示 ».

[187] Jisen Liu et Yufeng An, « The European Space Industry and the Enlightment [ouzhou hangtian gongye zhengce ji dui zhongguo de qishi] 欧洲航天工业政策及对中国的启示 », *Military Economic Research*, nº 09 (2006): 72-75.

operate commercial satellite launch services, export of complete satellites and international space technology cooperation. In February 2016, ExPace was established in Wuhan, becoming the first specialized rocket company in China to develop and apply the commercial model, and is committed to providing commercial space launch, satellite application, spacecraft launch and deep space exploration services for domestic and foreign customers. Commercial launches were conducted in 2017. China has all the conditions and capabilities to develop Commercial space, and state-owned enterprises play an important role in exploring the road to space commercialization."[188]

In a similar fashion, the article *CASC Opens Wide Commercial Space Door*[189] by Zhang et al. could be can be regarded as another example of advertisement for CASC

CASC's approach could be seen as an attempt to redefine the concept of *commercial space* to its own advantage, while outwardly encouraging it—an example of what has been coined as "playing the market card*"*, to qualify the discourses and action of SOEs that publicly endorse the liberalization of a sector, in line with central government directives, while simultaneously taking measures to hinder newly established private enterprises in order to preserve their dominance. The expression is used by Chen to describe the strategy of state-owned enterprises (SOEs) in the electricity supply sector during the liberalization of the market[190]. Since this liberalization was promoted by central authorities, the companies realized they could not oppose it outright as they had initially attempted to. They therefore adopted a second strategy: fully advocating liberalization in discourse, while resisting it in practice—delaying administrative processes, obstructing the proper establishment of new operators, etc.

Similar strategies have been observed in former state monopolies, particularly in the power grid sector.

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[188] Baohua Yang, 'Practise and Exploration of China Commercial space [zhongguo shangye hangtian de shilu yu tansuo] 中国商业航天的实践与探索', *China Aerospace*, no. 01 (2018): 6–10.
[189] Zhang et al., 'CASC Opens Wide Commercial space Door [zhongguo hangtian keji dakai shangye hangtian da men] 中国航天科技打开商业航天大门'.
[190] Ling S. Chen, "Playing the Market Reform Card: The Changing Patterns of Political Struggle in China's Electric Power Sector," The China Journal 64 (2010): 69–95.

3. *A Problem-Solution Approach*

This section analyzes a sample of Chinese-language specialized and academic literature on the commercial space sector. It aims to identify conceptual frameworks, points of tension, and areas of reform advocacy as expressed by domestic specialists.

Half of the articles in the sample (Nos. 4, 5, 6, 8, 11, 13, 14, 15, 17, 18, 23, 26, 27, 28) follow a similar structure that can be summed in three steps: first an introduction to the topic of commercial space, in the terms presented above of a desirable and or necessary and inevitable trend. The articles then go on to pinpoint obstacles to the development of this tendency. Finally, the authors make a number of suggestions to solve the corresponding issues.

Although the arguments are not the same from one text to another, it is possible to group these arguments into several large families presented below, which will allow the reader to become familiar with the major themes present in the treatment of the subject of commercial space in the Chinese academic and specialized literature

Although many authors make suggestions as to how to solve problems faced by commercial space, it is often not clear whom exactly they are addressing as to the implementation of these solutions. Concerning the first axis, it would be logical to assume the authors are addressing public authorities, institutions in charge of enacting and implementing new laws. As to the second axis concerning the market, they could also be addressing public authorities and possibly the leadership of SOEs. Concerning the third axis of enterprises, it seems they are addressing the entrepreneurship engaged in commercial space.

a. *Regulatory and Governance Challenges*

<u>Lack of Clear Policy Framework</u>

The lack of a legal, regulatory, and policy framework for commercial space and the inadequacy of existing rules is raised in 9 articles as an obstacle to its development in China (Nos. 5, 6, 8, 13, 15, 17, 18, 26, 27). Unsurprisingly, a majority of these articles are legal articles focusing specifically on policy, legal and regulatory issues. They may denounce the absence of rules relating to commercial space, and or raise a large number of existing rules, while pointing out

to their inadequacy or inappropriateness[191]. Feng draws a direct relationship between the dominance of government space project versus profit making activities and the ill-fitted character of the framework for commercial space activities, empathizing programmatic over legal framework.

"Since China's space industry has historically been mainly driven by government space projects, commercial spaceflight has not become the backbone of the space industry, resulting in a space management system that emphasizes programmatic management over legislative adjustments and a serious lag in commercial space legislation.[192]

[…] Only some departmental regulations have been promulgated sporadically […]. In addition, some administrative regulations or departmental regulations also play an indirect role in adjusting commercial aerospace […]. In general, the current legislation in China's aerospace field still presents: point by point (more fragmentary regulations) faceless (lack of system construction), with low (departmental regulation level) but no high (legal level), with principles (multi-macro regulations) and no rules (no specific and clear rules that can be clearly applied and is still far from establishing the legal system of property rights, contract legal system, tort legal system, commercial legal system and administrative legal system needed for the development of commercial spaceflight." [193]

Zhao and Zhang deplore the absence of a specific framework for commercial space.

"On a legal level, domestic space commercial legislation is still lacking. Current laws and regulations governing space activities include the "Measures for the Administration of Space Object Registration," "Interim Measures for the Administration of Civilian Space Launch Licenses," "Regulations of the People's Republic of China on Telecommunications," and "Regulations on Satellite Television Broadcasting Terrestrial Reception Facilities". Other laws and regulations, such as the Space Law and the Regulations on Satellite Navigation, are still

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[191] To list all the texts cited by the authors would go beyond the scope of this chapter, a study of relevant policy texts is conducted in Part 3 of this dissertation on the legal, programmatic and regulatory framework.

[192] Guodong Feng, "Discussing the Construction of China Commercial Space Legal System [lun zhongguo shangye hangtian de falv tixi goujian] 论中国商业航天的法律体系构建," *China Aerospace*, no. 09 (2017): 8–14. p.9

[193] *Feng.* p.12-14

being formulated. It is worth mentioning that none of these laws specifically regulates space commercial activities, which is a pity for China's space legislation."[194]

In his article, Gao Guozhu presents the existing legal framework for space activities in China, before criticizing it. The summary of the dedicated section is eloquent :

3. Evaluation and analysis of current complicated situation
1/ Accumulation of rules that can be applied to space
2/ Numerous texts, not specialized
3/ Large covering but blank spots and gray areas
4/Current system is dispersed, urgent need for general law[195]

Fragmented Leadership

This situation is sometimes associated with a lack of a clearly designated entity in charge, a lack of interest or attention from public authorities (articles nos 5,8,15,27). The expression "九龙治水" *jiulongzhishui*, literally "nine dragons control the river" comes in two authors (nos 8, 27) to describe the fragmented nature of the leadership in space activities.

"At the organizational management level, China's spaceflight is under multiple management, and there is no clear management agency for Commercial Space. In terms of planning and guidance, commercial space development has not been integrated into overall planning for comprehensive consideration. In terms of policies and regulations, there is a lack of policy documents specifically regulating commercial space activities, and there are blind spots in commercial rocket development, commercial satellite launches, and small satellite safety management." [196]

[194] Haifeng Zhao and Chao Zhang, "Study on the Commercialization and Legislation of China Aerospace [zhongguo hangtian shangyehua ji falv zhengce de yanjiu] 中国航天商业化及法律政策问题研究," *Space International*, no. 10 (2017): 52–57. P53
[195] Guozhu Gao, "An Analysis of the Domestic Legal Situation Based upon the Legislation of China's Space Law [woguo hangtian fali fasuo yituo de guonei falv huanjing fenxi] 我国航天法立法所依托的国内法律环境分析," *Journal of Northwestern Polytechnical University (Social Sciences).*, no. 04 (2019): 71-80+118. pp.76-78
[196] Shaoxian Yang and Hongwei Li, "2019 China Commercial Space Development Prospects [2019 nian zhongguo shangye hangtian fazhan xingshi zhan wang] 2019 年中国商业航天发展形势展望," *Satelllite Application*, no. 04 (2019): 48–53. p.51.

"At the same time, the State should also pay more attention to the legislation of space commerce, or it can set up a competent department to avoid the situation of " nine dragons controlling the river [九龙治水 jiu long zhi shui] "." [197]

The other way around, some authors point at the positive impact that the enaction of specific plans and regulations such as "National Civil Space Infrastructure Medium and Long-term Development Plan (2015-2025)"; "2016 National Defense Science and Industry Administration Military-Civil Integration Special Action Plan"; "2016 White Paper on Chinese activities". [198] This form of argument is also used when mentioning foreign experience, for which it is underlined that the enactment of specific policies had a bolstering impact (Nos 3,6,13,15).

Thus, for a significant portion of the authors in the sample studied, the lack of clarity in the policy framework governing space activities is identified as a major issue and a barrier to the development of commercial initiatives. The fragmented and difficult-to-identify nature of the responsible administrative bodies is widely criticized by these authors, who employ remarkably direct language.

These findings are particularly important when contrasted with a strand of the English-language literature discussed in the Introduction, which portrays China's space activities as monolithic and well-coordinated. In contrast, the perspective of domestic specialists reveals a situation that, if not outright chaotic, is at least polycentric and insufficiently defined from a policy standpoint. This issue is explored in further detail in Part 2 of this dissertation, drawing on primary regulatory sources.

Solutions Suggested: Better Legal and Regulatory Environment

The solutions proposed by authors defending this line of argument is to proceed to the drafting and application of legal, policy and regulatory texts dedicated to frame commercial space

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[197] Zhao and Zhang, "Study on the Commercialization and Legislation of China Aerospace [zhongguo hangtian shangyehua ji falv zhengce de yanjiu] 中国航天商业化及法律政策问题研究." p.56.

[198] Haifeng Zhao et Chao Zhang, « Study on the Commercialization and Legislation of China Aerospace [zhongguo hangtian shangyehua ji falv zhengce de yanjiu] 中国航天商业化及法律政策问题研究 », *Space International*, nº 10 (2017): 52-57; Jiayi Zhao, Guanghui Zhou, et Qi'ao Wei, « The Development Path of China's Commercial Aerospace from the Perspective of Business Model Innovation [shangye moshi chuangxin shijiao xia zhongguo shangye hangtian de fazhan zhi lu]商业模式创新视角下中国商业航天的发展之路 », *Science & Technology for Development* 17, nº 11 (2021): 1951-59; Shaoxian Yang et Hongwei Li, « 2019 China Commercial Space Development Prospects [2019 nian zhongguo shangye hangtian fazhan xingshi zhan wang] 2019 年中国商业航天发展形势展望 », *Satelllite Application*, nº 04 (2019): 48-53.

activities, as well as the identification or set-up of bodies in charge and a greater attention of public authorities.

"Formulate commercial space development plans. China has formulated many space development plans, such as the "2016 China Space" white paper and the "13th Five-Year Plan for Space Science", but it lacks a plan specifically for space commercialization. At present, China's space development mindset still does not focus much on commercial development, and in the future, it should pay more attention to space commercialization and suggest a special development plan for space commercialization to clarify the development direction for the future development of space commercialization in China."[199]

"Therefore, there is an urgent need for domestic legal circles and aerospace practice circles, from the perspective of promoting the development of commercial aerospace, to thoroughly sort out the specific legal practice of China's commercial aerospace activities, to deeply study the matching connection between commercial aerospace activities and the current civil and commercial law system, and to further discuss China's commercial aerospace activities. necessary legal elements, and put forward strategic and constructive opinions to support relevant national legislation."[200]

"China should attach great importance to the huge economic benefits and national security interests brought about by the development of commercial space and follow the trend by speeding up the introduction of a basic domestic space law and complementary laws, regulations and policies in the field of commercial space, so as to guide, protect and lead the development of commercial space with laws and policies."[201]

It is interesting to note that these proposals are generally made in addition to a call prominent role for the state as a guide to commercial space.

"*National policies and laws and regulations are the guarantee for the development of commercial spaceflight, and the development of commercial spaceflight activities must be guided by corresponding national policies and legal regulations, as well as the necessary*

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[199] Zhao and Zhang, "Study on the Commercialization and Legislation of China Aerospace [zhongguo hangtian shangyehua ji falv zhengce de yanjiu] 中国航天商业化及法律政策问题研究." P56
[200] Feng, "Discussing the Construction of China Commercial Space Legal System [lun zhongguo shangye hangtian de falv tixi goujian] 论中国商业航天的法律体系构建." p9
[201] Liu and Zhang, "The Development and the Legal and Regulatory System of Space Commercialization [Hangtian Shangyehua Jiqi Falv Guizhi] 航天商业化发展及其法律规制." p.20

guidance and support from the state and professional institutions for some commercial spaceflight activities."[202]

"First, in terms of organization and management, we should clarify the competent departments of commercial space and establish a regular coordination mechanism between the military and the ground, so as to solve the lack of position and confusion in the management of commercial launch and commercial remote sensing at the present stage and ensure the controlled risk and rapid and smooth development of commercial space development.

Second, in terms of planning and guidance, we should make efforts to strengthen the convergence of planning plans and incorporate commercial launches, commercial satellite measurement and control, satellite frequency and orbital resources coordination, and space data exchange and sharing into the national top-level space development plan.

Third, in terms of policies and regulations, we should widely collect opinions and jointly issue guidance on promoting commercial space development as soon as possible, so as to clarify the principles, framework of responsibilities and rights, and ways to promote commercial space development in a standardized and orderly manner, with emphasis on government guidance and direction."[203]

b. *A failing free market*

A dozen of authors underline what they consider to be the failure of the free market in the space sector (Nos. 2, 4, 5, 8, 13, 15, 17, 18, 23, 24, 26, 29). The failure is explained according to them by the characteristics of space activities, and/ or by the pressure exerted by SOEs regulatory barriers to entry imposed on new entrants. These approaches are summed in the following quotes:

"The concentration of the space industry, barriers to entry, and the structure and attributes of space products determine the special characteristics of the space industry in terms of operation

[202] Tong and Wang, "Risk Study of China's Commercial Space Development [woguo shangye hangtian fazhan fengxian yanjiu] 我国商业航天发展风险研究." p.30
[203] Yang and Li, "2019 China Commercial Space Development Prospects [2019 nian zhongguo shangye hangtian fazhan xingshi zhan wang] 2019 年中国商业航天发展形势展望."

mechanism, and the market structure of the space industry is an oligopolistic imperfectly competitive market." [204]

"There are many reasons why private companies are rarely involved in the space sector, including national policy restrictions on the one hand, and the high capital and technology requirements, high risks, and long payback periods for spaceflight on the other. China has strict restrictions on the entry of private and foreign enterprises into the space sector, such as the Catalogue of Government Approved Investment Projects, the Catalogue for the Guidance of Foreign Investment (Revised Edition) and the Administrative License Law, which all require the review and restriction of objects entering the space sector." [205]

Specific Market Characteristics

First of all, space as a sector of activity would present characteristics that make it difficult to set up a free market. Commercial space activities are designated as a technically risky activity, involving high technology, requiring heavy investment, but with a long period of return which discourages private investors This state of affairs is summarized by a formula of the "three high" [三高 *san gao*] that comes up in six articles of the sample[206] (Nos 2, 5, 6, 8, 15, 17) in different variants: *high costs*, *high tech, high risks*, and a *long period of return on investments*.

"When carrying out commercial space programs, the particularity of space investment projects should be fully considered, that is, high technical risks, large one-time investment and long payback period."[207]

"China's space industry has always been dominated by the state, and the voice of private capital is largely unheard of in the space sector. There are many reasons why private companies are rarely involved in the space sector, including national policy restrictions and

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[204] Gao Li and Xiaoguang Zhang, "The Influence and Revelation of Deregulation on the US Commerical Space Industry [fangsong guanzhi dui meiguo shangyehangtian fazhan de yingxiang ji qishi] 放松管制对美国商业航天发展的影响及启示," *Satellite Application*, no. 01 (2015): 58–61. p.58

[205] Zhao and Zhang, "Study on the Commercialization and Legislation of China Aerospace [zhongguo hangtian shangyehua ji falv zhengce de yanjiu] 中国航天商业化及法律政策问题研究." P55

[206] Besides the article quoted below, this argument is also present in: Liu, Tang, and Rao, "Thoughts On the Regulation of Development of Commercial Space Launchers in China [guanyu guifan woguo shangye hangtian yunzai huojian fazhan de sikao] 关于规范我国商业航天运载火箭发展的思考"; Feng, "Discussing the Construction of China Commercial Space Legal System [lun zhongguo shangye hangtian de falv tixi goujian] 论中国商业航天的法律体系构建."

[207] Tong and Wang, "Risk Study of China's Commercial Space Development [woguo shangye hangtian fazhan fengxian yanjiu] 我国商业航天发展风险研究." p.30

the high capital and technology requirements, high risks, and long payback periods of spaceflight."[208]

Some authors also perceive a potential for *high return*.

"Aerospace science and technology, as a "high-end" technology, has huge returns in the later period, but huge investment in the early stage. The huge investment greatly raises the threshold for commercial spaceflight entry. In addition to financial and technical shortcomings, China's space commercialization also faces problems such as inadequate laws and regulations and an imperfect space market competition system."[209].

"Second, it is important to coordinate the development of military, civil and commercial space activities. Aerospace is a technology-intensive and capital-intensive industry, characterized by high investment, high risk, and high benefits. After the achievements of aerospace technology are converted into civilian use, the market value derived from them is huge. China's space activities need to be further strengthened in terms of coordinated civil-military development and civil-military integration, so that space technology can play its best role in economic construction, diplomacy, national defense and military fields." [210]

Unfair Competition, Institutional Sclerosis

On the other hand, the "marketization" of space would be slowed down by the action of SOEs monopolistic practices (Nos 5, 6, 8, 12, 18), effectively putting barriers to new entrants, a situation that is expressed in a very direct fashion by Gao Guozhu, who denounced unfair competition between SOEs and *minying* enterprises. This idea is also reflected in Liu and Zhang.

"In China, there exists a structure comprising state-directed programs (which now also widely adopt a bidding mechanism and are primarily undertaken by state-owned enterprises), independent R&D and business activities by state-owned enterprises (profit-oriented), and minying enterprises engaged in profit-driven space activities. SOEs operating with state-owned

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[208] Zhao and Zhang, "Study on the Commercialization and Legislation of China Aerospace [zhongguo hangtian shangyehua ji falv zhengce de yanjiu] 中国航天商业化及法律政策问题研究." p.55
[209] Liu and Zhang, "The Development and the Legal and Regulatory System of Space Commercialization [Hangtian Shangyehua Jiqi Falv Guizhi] 航天商业化发展及其法律规制." p.20
[210] Liu and An, "The European Space Industry and the Enlightment [ouzhou hangtian gongye zhengce ji dui zhongguo de qishi] 欧洲航天工业政策及对中国的启示." P.75

assets under state authorization, enjoy autonomy in operations, while private enterprises face entry barriers and restricted areas in the aerospace field.

This context gives rise to numerous challenges: SOEs, as businesses, aim for profitability, but who ultimately benefits from state investments and profits? If profits are made through monopolistic practices, it equates to competing with minying enterprises for gains. From the perspective of minying enterprises, lacking sufficient technology and experience and constrained by market segmentation and monopolies within the established system, it is difficult to enter core aerospace industries. Although breakthroughs have been made in areas like rocket development, small satellite manufacturing, and application services, there is still a lack of effective supporting policies and mechanisms in terms of deregulation, oversight, and services. This creates a situation where over-regulation stifles activity and under-regulation leads to disorder. This background has given rise to many problems." [211]

"Although China's commercial spaceflight business has made a firm start, it is still a bit late and still lags far behind international spaceflight powers. The commercialization of spaceflight is hampered by the traditional model, the monopoly of state-owned enterprises to a large extent, the lack of financial and insurance support for commercial spaceflight, and the lack of legislation on spaceflight, especially commercial spaceflight, are all problems that hinder the development of commercial spaceflight"[212].

Some authors discussing the challenges faced by commercial space enterprises when entering the market attribute these difficulties to structural characteristics of the space sector itself, while others point more directly to institutional sclerosis or even anti-competitive practices by SOEs.

We can hypothesize that these positions reflect different levels of political correctness: directly accusing SOEs of anti-competitive behavior is likely less politically palatable than emphasizing objective market conditions without assigning blame. The issue of market structure in the commercial launch segment is analyzed in greater depth in Part 3 of this dissertation.

These findings are also significant when compared with the English-language literature discussed in the introduction, as well as the findings from earlier sections of Chapter 2. They

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[211] Gao, "An Analysis of the Domestic Legal Situation Based upon the Legislation of China's Space Law [woguo hangtian fali fasuo yituo de guonei falv huanjing fenxi] 我国航天法立法所依托的国内法律环境分析." p.77
[212] Liu and Zhang, "The Development and the Legal and Regulatory System of Space Commercialization [Hangtian Shangyehua Jiqi Falv Guizhi] 航天商业化发展及其法律规制." p.20

underscore the presence of tensions between the state sector—represented by traditional actors or SOEs—and minying (private) enterprises. The existence of such tensions challenges both the portrayal found in some English-language sources of a monolithic space sector moving toward a single objective, and the harmonious narrative often promoted in politically mainstream Chinese discourse.

Solutions: Opening Market, Financial Support, Procurement

Starting from the observation that commercial space enterprises are disadvantaged by the very nature of the activity and sometimes a form of institutional sclerosis, the authors mainly propose: ensuring an open and fair market via dedicated policies and mechanisms; have the state act as a "big buyer" and perform procurement in an equitable competition between traditional enterprises and commercial enterprises including *minying*. Hence, it is State intervention that is deemed necessary to ensure fairer market conditions. Other arguments mentioned, that were treated in the previous subsection include the encouragement of infrastructure sharing, which is associated with Civil Military Integration (CMI); innovative financing solution including mixed-ownership.

"The FutureSpace law should not only consider creating equal opportunities for all types of subjects to engage in space activities, but also consider reforming the current management model, promoting mixed ownership reform, improving the procurement system for civilian and military products, and promoting a large inflow of private capital into the space sector to alleviate the huge investment by the state, which is a long way to go."[213]

Opening Market

In the sample, 7 articles call for regulatory and policy reforms to encourage the opening of the commercial space market (Nos 6, 8, 12, 15, 18, 23, 28), including reducing regulatory and institutional barriers and encouraging fair competition between SOEs and minying enterprises.

"China should address the fundamental need for legislation for the commercialization of space. The legal requirements for space commercialization are, in general, twofold: removing institutional barriers and obtaining policy support.

[213] Gao, "An Analysis of the Domestic Legal Situation Based upon the Legislation of China's Space Law [woguo hangtian fali fasuo yituo de guonei falv huanjing fenxi] 我国航天法立法所依托的国内法律环境分析." p.77

If space start-ups are to have a favorable environment for development, they must first remove institutional barriers. At the same time, these companies are looking for technical and financial support. Private space start-ups want to collaborate, as NASA and SpaceX have done, to gain access to the mature technology of state-owned enterprises to develop more advanced technologies on the shoulders of giants, and to gain financial support from the state to leverage more capital and profits."[214]

"There is a need to develop a sound legal system that can promote and regulate the development of commercial spaceflight, and such a system should cover four levels: first, at the level of industrial competition law, to establish a more open market environment and an institutional environment that encourages competition, and to reduce the legal barriers for private high-tech enterprises to enter deeply into the space industry chain. Second, at the level of industrial structure law, the legal and institutional barriers to the leap of China's aerospace industry from a manufacturing-oriented industry to one that emphasizes both manufacturing and services are effectively removed at the levels of military-civilian integration, finance and insurance, fixed asset investment, aerospace personnel policies, tax incentives, and intellectual property protection […]."[215]

Financial Support, Budget, Finance

Several authors advocate for encouraging financing through the state budget as a means of supporting the commercial space sector, sometimes under mixed modalities also involving social capital. (Nos 6, 8, 13, 23, 27, 28, 30) [216] [217]

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[214] Liu and Zhang, "The Development and the Legal and Regulatory System of Space Commercialization [Hangtian Shangyehua Jiqi Falv Guizhi] 航天商业化发展及其法律规制." p.20

[215] Feng, "Discussing the Construction of China Commercial Space Legal System [lun zhongguo shangye hangtian de falv tixi goujian] 论中国商业航天的法律体系构建." p.13

[216] Jian Zuo, "Guoke Jiahe: Multi-Link Layout of Satellite Manufacturing and Satellite Applications [guoke jiahe duo huanjie buju weixing zhizuo yu weixing yinyong] 国科嘉和:多环节布局卫星制造与卫星应用," *Satellite Application*, no. 05 (2021): 26; Jian Zuo, "China's Commercial Spaceflight: Waiting for Breakthrough, Embracing Opportunities [zhongguo shangye hangtian jingdai tupo, yingjie jiyu] 中国商业航天:静待突破,迎接机遇," *Satellite Application*, no. 05 (2021): 27–28; Jianfeng Sun and Min Niu, "Research on Commercial Aerospace Enterprises of the Department of Chinese Academy of Sciences from the Perspective of Industrial Chain [chanyelian shijiao xia zhongguo kexueyuan xi shangye hangtian qiye yanjiu] 产业链视角下中国科学院系商业航天企业研究," *Aerospace China*, no. 02 (2021): 47–52.

[217] Li and Zhang, "The Influence and Revelation of Deregulation on the US Commerical Space Industry [fangsong guanzhi dui meiguo shangyehangtian fazhan de yingxiang ji qishi] 放松管制对美国商业航天发展的影响及启示."

"From the perspective of national strategy, the government needs to increase the investment in basic space research, implement tax incentives for private space enterprises to enter basic space research, and encourage donations or the establishment of foundations, etc. As a typical cross-disciplinary industry, the government needs to help build common technology platforms, actively promote the data and resources of traditional spaceflight and other national research platforms to further open them to private space enterprises, fully cross-fertilize China's commercial space with other industries, promote industry chain diversification, and help private space enterprises realize closed business models."[218]

"As no business activity can be conducted without financial support, it is important to create a regular and healthy investment and financing environment. With regard to the characteristics of China's economic environment, a reasonable and feasible policy system can be implemented in terms of finance, taxation and institutional models to provide channels for social capital to participate in the formation and operation of commercial space companies in China and to facilitate their rapid growth. For example, a commercial space innovation and development fund should be established to support and encourage commercial space development; preferential treatment or financial subsidies should be given to commercial space companies in terms of taxes, loans and import tariffs; and commercial space companies should be guided and encouraged to establish launch alliances 发射联盟 with state-owned spaceflight companies to regulate the commercial space launch market and promote civil-military integration in the commercial space sector."[219]

"Increase support for the commercial space industry. Although the country has not announced specific space budget figures, Xu Dazhe, then director of the National Space Administration, said in a question-and-answer session on the first China Space Day in 2016 that China's space budget was roughly 1/10th that of the U.S. In 2015, the U.S. space budget was $17.5 billion, while China's was about $1.75 billion, or about RMB 12 billion. The U.S. space budget in 2015 was $17.5 billion, while China's was about $1.75 billion, or about 12 billion yuan. Although national support is strong, support for space commercialization-related industries is limited.

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[218] Zhao, Zhou, and Wei, "The Development Path of China's Commercial Aerospace from the Perspective of Business Model Innovation [shangye moshi chuangxin shijiao xia zhongguo shangye hangtian de fazhan zhi lu] 商业模式创新视角下中国商业航天的发展之路."

[219] Liu, Tang, and Rao, "Thoughts On the Regulation of Development of Commercial Space Launchers in China [guanyu guifan woguo shangye hangtian yunzai huojian fazhan de sikao] 关于规范我国商业航天运载火箭发展的思考." p.43

The successful experience of major foreign spacefaring nations shows that the benefits of inputs and outputs in commercial development certainly exceed those of other industries."[220]

Procurement

The implementation of State Procurement is mentioned in 7 texts (Nos 3, 8, 13, 15, 23, 27, 30)[221].

"In China, the government is traditionally thought to be responsible for all of these tasks. In fact, the government does underwrite much of the space business by setting up institutions and investing in state-owned enterprises. This includes a significant amount of content that could be converted into government procurement. In the infancy of the industry, there is nothing wrong with the government using this type of approach. But as we reach the threshold of space commercialization and the commercial space age, the government must consider changing its role to that of a good, big buyer."[222]

"The size of market capacity is an important factor affecting barriers to entry, as there are economies of scale in the space industry, and the limited market capacity of the global space industry creates barriers to entry for the development of commercial spaceflight. The United States uses government procurement as a guide, arranges sufficient orders in advance, leaves sufficient profit margin, and supports the growth of private enterprises. In December 2008, SpaceX, for example, won a $1.6 billion Commercial Resupply Services (CRS) contract from NASA to deliver cargo to the International Space Station (ISS) in 12 shipments using the Dragon spacecraft. In June 2010, SpaceX was awarded a $492 million commercial launch contract to launch Iridium into geosynchronous orbit on a Falcon-9 rocket. The large number

[220] Zhao and Zhang, "Study on the Commercialization and Legislation of China Aerospace [zhongguo hangtian shangyehua ji falv zhengce de yanjiu] 中国航天商业化及法律政策问题研究." p.55

[221] Tong and Wang, "Risk Study of China's Commercial Space Development [woguo shangye hangtian fazhan fengxian yanjiu] 我国商业航天发展风险研究"; Liu, "The Prospects of China Space Commercialization and Commercial Space [zhongguo hangtainshangyehua yu shangyehangtian de qianjing] 中国航天商业化与商业航天的前景"; Zhao and Zhang, "Study on the Commercialization and Legislation of China Aerospace [zhongguo hangtian shangyehua ji falv zhengce de yanjiu] 中国航天商业化及法律政策问题研究"; Jingnan Zhang, "Viewpoint About Four Industry Directions of Commercial Space [shangyehangtian sida chanye fangmian shendu guandian] 商业航天四大产业方面深度观点," *Aerospace China*, no. 10 (2020): 26–34.

[222] Liu, "The Prospects of China Space Commercialization and Commercial Space [zhongguo hangtainshangyehua yu shangyehangtian de qianjing] 中国航天商业化与商业航天的前景." p.32

of procurement contracts awarded early on has been a major help to private companies in gaining market capacity and viability."[223]

c. *An Inadequate Business Model of Enterprises*

Minying Enterprises in Lack of a Business Model

The business model of existing companies is qualified by six authors as inadequate, because insufficiently focused on demand on the one hand, and on the development of industrial chains on the other hand (Nos 5, 11, 12, 14, 23, 27).

Over the past five years, entrepreneurial companies have emerged one after another. However, as of now, no profitable commercial space companies have been established in China. Among several minying rocket companies, only two have successfully launched rockets into their intended orbits. China's aerospace technology is at an advanced level globally, but commercial space is still unable to break through its bottleneck and truly enter the market. To a large extent, this is due to the fact that China's commercial space has not yet formed a mature business model. 23 P 1951

"Commercial space is all about commercialization, but at present most commercial space organizations do not have a viable business model for users and the market, making it difficult to see a sustainable business loop. For example, in the field of private launch vehicles, the launch price is currently not competitive, and it is very difficult to achieve a significant cost reduction on the existing basis, so future development needs to find a differentiated and distinctive competitive route. In the field of commercial remote sensing satellites, the business model and market sales are also not satisfactory. In the field of communication satellites, the domestic terrestrial mobile communication market is large, and Tiandi 1 天通一号, which is in the initial stage, does not have advantages in the short term, and there is still a long way to go for large-scale application, and the business model and operation mode also need to be explored."[224]

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[223] Li and Zhang, "The Influence and Revelation of Deregulation on the US Commerical Space Industry [fangsong guanzhi dui meiguo shangyehangtian fazhan de yingxiang ji qishi] 放松管制对美国商业航天发展的影响及启示."

[224] Yang and Li, "2019 China Commercial Space Development Prospects [2019 nian zhongguo shangye hangtian fazhan xingshi zhan wang] 2019 年中国商业航天发展形势展望."

"An industry does not just give itself the title of "commercial" and operate according to the laws of the market. At the recent commercial space summit, a worrying uniformity emerged: almost all manufacturers and operators were talking about their platform advantages or technical specifications, but rarely about their business models. Even some commercial remote sensing satellite companies that have been operating for many years and have already procured second-generation satellites are worried about not being able to sell their images, so they are bluntly asking the government to place orders with them, otherwise the state will not be able to recover its investment. This cannot be called a commercial model in any way. This shows that what is lacking in China's space commercialization and commercial spaceflight is not licensed companies, but commercial thinking in the true sense of the word.". [225]

Solutions: Focus on market demand

In order to solve these issues, some authors urge companies to focus on their business model, reorienting themselves towards consumer demand and the development of industrial chains.

"From the perspective of private space enterprises, they should not only focus on technological innovation, but also accelerate the speed of space technology implementation, take user needs as the core to deeply explore various possibilities of commercial space applications, provide a series of consumer needs closely related to the terminal, and let China's advanced space technology truly enter the life of the public, so as to truly realize an integrated closed business model."[226]

At present, from the perspective of commercial development and its profit model, the more successful and mature fields mainly include commercial satellite communications (satellite fixed communications, satellite TV broadcasting, etc.) and commercial satellite navigation, etc. The emerging commercial space fields such as space Internet and space tourism are still in the exploration stage, and the business models are yet to be studied and practiced. For example, although Musk's SpaceX has achieved great success in basic space industry fields such as launch vehicles and spacecraft, and the company's valuation has long exceeded $10 billion, its profitability has been questioned, and whether the business model can be replicated in China

[225] Liu, "The Worries of China Space Commercialization and Commercial Space [zhongguo hangtian shangyehua yu shangyehangtian de youxin] 中国航天商业化与商业航天的忧心."p.28
[226] Zhao, Zhou, and Wei, "The Development Path of China's Commercial Aerospace from the Perspective of Business Model Innovation [shangye moshi chuangxin shijiao xia zhongguo shangye hangtian de fazhan zhi lu] 商业模式创新视角下中国商业航天的发展之路."

has yet to be proven. Therefore, in addition to proper guidance at the national policy level, the development of commercial spaceflight requires investors or entrepreneurs to take into account their own practical capabilities, especially their risk tolerance, and not to follow the trend blindly, but to adhere to market needs and fully understand the risks unique to spaceflight, and invest rationally.[227]

"Another important responsibility of commercial space companies is to work together to create and open up the industry chain. The success of Steve Jobs and Apple was not about building a touch screen phone, but about creating a new industry chain and connecting the upstream and downstream. Many of today's entities and investors intending to invest in commercial space ventures are quick to discuss system parameters and metrics, and lightly describe what their platforms have to offer.

But they never discuss what exactly is a commercial space enterprise, nor what exactly is the industry chain and how to form it." [228]

In all of her articles present in the sample, Liu Yufei is a strong advocate of consumer-oriented business strategies, a mindset she also wishes to see applied to SOE. Liu Yufei's approach is particularly strong, as she denounces a commercial space that would ultimately rely on state procurement. On the contrary, she rejects such an attitude as 'lazy'.

"In the early stages of commercial spaceflight development, the consumer market has not yet been cultivated, and companies may still have to rely on industry customers to obtain the resources to survive. But this is only temporary and cannot be a long-term solution. Commercial space must make it its industrial responsibility to eventually enter the consumer market and serve the end consumer. It is also important to emphasize that even in this initial, temporary business model, the industry we are talking about is not national ministries or government departments, but the real backbone of the industry, especially the backbone of minying industry.

If commercial spaceflight companies are still like traditional spaceflight companies, hoping to find a piece of "monk's meat" in the traditional sense of the satellite application sector through

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[227] Tong and Wang, "Risk Study of China's Commercial Space Development [woguo shangye hangtian fazhan fengxian yanjiu] 我国商业航天发展风险研究." p.30
[228] Gao and Fu, "New Line of Thought on Commercial Space Development [hangtian shangyehua fazhan de xin siwei] 航天商业化发展的新思维." p.42

official documents and doorways, then there is no need to engage in commercial spaceflight. Commercial spaceflight companies need to be more attentive in exploring niche markets, finding specific potential users, developing truly disruptive applications, addressing immediate needs, realizing high-frequency applications, and ultimately enabling users to form business dependencies. As we mentioned earlier, some companies are keen to pursue national orders and even shout about it publicly. In response, many in the industry have said that the business is too lazy."[229]

The analysis of our sample for Chinese specialized literature on commercial space reveals a notable internal critique of the regulatory, economic, and institutional foundations of the sector. Far from the streamlined and harmonious image portrayed in the English-language literature, sometimes even of Chinese politically correct discourses of a harmonious playing field, some authors of the sample identify a sector hampered by legal ambiguity, fragmented leadership, difficult market conditions aggravated by inertia and possible unfair behavior playing in favor of SOEs over *minying* enterprises.

The spectrum of suggested remedies—ranging from legislative reforms and market-opening policies to procurement-based support and consumer-oriented business models—ultimately reveals a paradox. While these specialized authors frame their arguments in the language of market efficiency and competition, the solutions they propose ultimately call upon the state to intervene, arbitrate, or restructure the system. In this way, the state remains the implicit addressee of these appeals, as gatekeeper expected to set the conditions for a fairer playing field. What emerges is not a call for less state presence, but for a different kind of state presence: one that enables market dynamics without reproducing monopolistic control.

Thus, the literature surveyed not only expands our understanding of how commercial space is conceptualized and critiqued from within China but also challenges simplistic binaries between "state" and "private," revealing instead a complex constellation of actors, interests, and constraints.

Chapter Conclusion

In this chapter, we have observed that the majority of articles in the sample portray commercial space activities not only as a positive development but also as an inevitable and necessary

[229] Liu, "The Prospects of China Space Commercialization and Commercial Space [zhongguo hangtainshangyehua yu shangyehangtian de qianjing] 中国航天商业化与商业航天的前景." pp.31-32

evolution, creating the impression of a genuine consensus among authors. However, this consensus holds only insofar as one assumes that all authors are referring to the same concept when they use the term "commercial space" —which, upon closer examination, is not the case. We can hypothesize that the apparent consensus on the benefits of commercial space, while masking divergences in the definition and role of different actors behind the use of a common term, reflects the presence of a politically correct discourse. The existence of such a positive discourse regarding commercial space could stem from the fact that "commercial space" is encouraged by the central government, as we will study closely in the next Chapter.

As a result, openly opposing it would be difficult: within the corpus, there is only one instance of an author explicitly rejecting commercial space activities. However, it is possible that certain actors seek to define commercial space in ways that serve to protect or advance their own interests. On the one hand, the SOEs CASC and CASIC seem to aim at maintaining their monopolistic position, arguing, for instance, that in China, commercial space is not limited to private enterprises but also prominently involves state-owned companies. On the other hand, proponents of independent private enterprises strive to carve out a place for themselves, asserting, for example, that the natural course of history points toward the privatization of space activities, following the model of SpaceX.

Yet, as observed in Chapter I, CASC theoretically has more extensive means to promote its own definition, particularly in specialized publications. The majority of publications associated with the search term "Chinese commercial space" on CNKI are, in fact, sponsored by the SOE, placing it in a position of *de facto* discursive dominance, potentially enabling it to influence discourse on the subject in alignment with its agenda. If this hypothesis proves correct, one could describe CASC's actions as a case of "playing the market card".

Demonstrating such a hypothesis is challenging. As discussed in Chapter I and in the previous sections of this chapter, commercial space activities are more frequently covered in specialized press publications than in journal articles. Authors make limited use of footnotes, making it difficult to trace the genealogy of ideas.

Moreover, this hypothesis fundamentally rests on the notion of implicit content: if SOEs were indeed engaging in a "playing the market card*"* strategy, they would not explicitly acknowledge it, as such an approach would ultimately contradict central government directives. For instance, while some articles in the corpus have been identified as promotional texts for CASC, they are neither explicitly labeled as such nor do they overtly argue that the SOE should maintain a

monopoly on space activities to the detriment of private enterprises. However, it is possibly the implicit message conveyed—by portraying the company as a leading force in a commercial space sector that is beneficial, necessary, and with experience in the field dating back to the 1980s.

Part 2 – Policy Framework for Commercial Space Activities and the Launch Sector: Polycephalous, Fragmentary, Incremental

In this Part 2, the policy framework for Chinese commercial space launch activities will be examined in light of the finding of Part 1 of this dissertation, enabling a transition to the subsequent Part 3 which consist of a case study on the field of launch vehicles. Firstly, a list of policies gathered by FutureSpace Technology Research Institute (hereinafter also FutureSpace) identified as relevant for Chinese commercial space is provided and commented upon (Chapter III). Then, we delve deeper into the framing of commercial space in the successive *White Papers on Chinese Space Activities*, in order to understanding the evolution of the framework governing commercial space launch sector (Chapter IV).

III. Chapter III – Study of a List of Policies Relevant to Commercial Space activities

This Chapter III aims to provide an introductory overview of relevant policies and regulations on commercial space from a selection of texts drawn from the report of FutureSpace Technology Research Institute titled *Commercial Space Development Report 2022* [中国航天发展报告 *2022 zhongguo hangtian fazhan baogao*][230].

As highlighted by several Chinese authors presented in Chapter II of this dissertation, the framework for Chinese commercial space activities is characterized by a multitude of non-specialized texts that can be applied to the space sector but are not organized into a coherent system (e.g., see Feng and Gao[231]). This results in a certain degree of ambiguity concerning the framework, particularly reflected in the lack of a systematic identified list of regulatory and policy texts relevant to commercial space activities.

This critique is a recurring theme in academic and specialized literature[232] and has also been echoed by operational stakeholders on the field during exchanges, as will be developed Chapter VII.

Hence, there is no official list or consensus regarding what primary regulatory texts are relevant for Chinese commercial space activities or commercial launch.

The lists proposed by the authors in the sample of articles presented Chapter II do not necessarily overlap. Additional lists of texts have also been idxentified during this research, such as a report by Essence Securities discovered early in the research, or the list compiled in the IDA report[233], Yuan Yuan and Peeters[234]. Furthermore, other lists are included within the primary regulatory texts themselves. A more comprehensive list mixing these sources is included in Annex to Part 2.D. *Enlarged list of regulatory texts relevant to commercial space activities in the PRC*.

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[230] "Commercial Space Development Report 2022 [中国航天发展报告 2022 Zhongguo Hangtian Fazhan Baogao]" (FutureSpace Space Technology Research Institute, 2022).
[231] Feng, "Discussing the Construction of China Commercial Space Legal System [lun zhongguo shangye hangtian de falv tixi goujian] 论中国商业航天的法律体系构建"; Gao, "An Analysis of the Domestic Legal Situation Based upon the Legislation of China's Space Law [woguo hangtian fali fasuo yituo de guonei falv huanjing fenxi] 我国航天法立法所依托的国内法律环境分析."
[232] Yun Zhao, *National Space Law in China: An Overview of the Current Situation and Outlook for the Future* (Leiden Boston: Brill Nijhoff, 2015). p.38-39
[233] Liu et al., "Evaluation of China's Commercial Space Sector."
[234] Yuan and Peeters, "Research Viewpoint."p.194

Main findings

First and foremost, the analysis of the policy and regulatory framework for commercial space activities compiled in the list of texts gathered by FutureSpace allows us to illustrate the polycentric nature of policy making related to space activities in China. This was discussed by authors in Chapter II of this dissertation and abundantly mentioned by English-language sources[235] (Chapter III.A.).

Six key organs are identified among the enactors of these texts: the State Council, the Central Military Commission (CMC), the National Development and Reform Commission (NDRC), the Ministry of Industry and Information Technology (MIIT), the Ministry of Finance (MoF), and the State Administration for Science, Technology, and Industry for National Defense (SASTIND).

The prerogatives of these different bodies and their hierarchical levels highlight that the policy and regulatory framework for commercial space activities lies at the intersection of multiple agendas: economic development, military strategy, and technological advancement. Notably, commercial space is embedded within China's national economic development strategy through the designation of priority sectors identified as high-potential industries, a perspective that is rarely examined in English-language literature on commercial space.

On the other hand, the list of texts compiled by FutureSpace includes documents of varying nature and scope, ranking relatively low in the hierarchy of Chinese legal norms, which reflects some of the criticisms of the policy and regulatory framework for commercial space activities identified in Chapter II. There are national and cross-sectoral strategies and plans, but also very concrete implementation notices. Some documents adopt a broad focus that includes a space-related component, while others are specifically dedicated to space activities (Chapter III. B.).

Finally, an analysis of the provisions of the selection of texts highlights an evolution in the scope of commercial space within these documents. The chronology of the texts compiled by FutureSpace begins in 2007 with the first sectoral policy encouraging the entry of non-state capital for the development of satellite applications. The provisions concerning the commercial space sector in the subsequent texts compiled by FutureSpace highlight a progressive opening of the space sector to “social and popular capital”, understood respectively as non-state and

private capital: initially confined to the downstream sector of space applications, later extending to satellite manufacturing, and eventually explicitly encouraged in the development of launchers. The evolution of these provisions underscores that while there is a consensus on placing the emergence of policies favorable to commercial space in the mid-2010s, this mainly refers in fact to the entry of social capital into the *upstream segment* of space activities, not of all space activities at once.

Furthermore, while the definition of commercial space is contested by the authors in Chapter II, primary texts reveal an inherently pluralistic nature to the type of entrepreneurship model and investment that is encouraged under the term “commercial space”. Policy relevant to commercial space encourages the entry of social and popular capital into certain sectors of space activities, without predetermining the exact modalities. The potentially polymorphic nature of its implementation is well illustrated in the 2012 *Implementation Opinions on Encouraging and Guiding Private Capital to Enter the Field of National Defense Science and Technology Industry*: civil-military integration encourages both the opening of sectors to independent private operators and investors, their participation in the mixed reform of private enterprises, and a variety of hybrid models.

The ambiguous nature of these provisions also leaves room for top-down implementation. In the regulatory framework, the vagueness of these concepts may in fact allow for various interpretations and concrete implementations of different forms. Ultimately, the regulatory framework appears to have an exploratory nature, which can be explained by the nature of these texts. Largely issued by high-level bodies, programmatic, and weakly binding, they primarily provide general directions to the actors responsible for their concrete implementation, whether they be local governments, SOEs, or private enterprises (Chapter III. E.).

A. FutureSpace Commercial Space Development Report 2022, a Relevant and Useful Source

1. Analyzing the Policy Framework from a FutureSpace Compilation

The list below is taken from the report by the specialized think tank and investor FutureSpace, titled *Commercial Space Development Report 2022* [中国航天发展报告 2022]. The full report is not public but was made available during an interview with a senior worker of a specialized consulting enterprise (Chapter VII exchange no. 5). Photographs could be taken of the following list of official texts, under a section called *National Level Commercial Space Development Policies* [国家层面商业航天发展政策 *guojia centmian shangye hangtian fazhen zhengce*] pp. 13-15 of the report.

I have chosen to use this list in a Chapter III dedicated to the policy framework for commercial space, because it originates from a well-established Chinese source. FutureSpace enjoys strong visibility in the space sector. Their presence in specialized literature was identified Part 1, as Sun Jianfeng and Niu Min, both workers of the enterprise, stand among most publishing authors in the search results on CNKI Chapter I, and as producing qualitative and original content Chapter II. FutureSpace is systematically present at *Commercial Space Industry and Investment Forum* of the CSC, where they serve as co-organizers and present their annual report on this occasion.

According to an interview with a senior worker of a specialized consultancy company (exchange no. 7), their publications target a diverse range of Chinese national stakeholders, primarily potential investors, enterprises, and public authorities at both central and provincial levels. It is essential to keep these target audiences and their respective agendas in mind when considering this list, which was compiled as material for consultancy operational stakeholders, rather than for legal commentary or political analysis.

Prioritizing such original sources oriented towards Chinese stakeholder is a key aspect of this dissertation, and the list of texts compiled in the 2022 *China Commercial Space Development Report* provides a selection of texts identified as relevant to Chinese commercial space activities by a local entity with recognized expertise.

2. *Commercial Space as the Entrance of Popular Capital in the Civilian Space Infrastructure*

The section of the report containing the list, *National Level Commercial Space Development Policies,* [国家层面商业航天发展政策 *guojia cengmian shangye hangtian fazhan zhengci*] opens with the following paragraph:

"*Since 2014, the State has introduced a number of policies to encourage private capital [民间资本 minjian ziben] to enter the field of civil space infrastructure construction in an orderly manner, while at the same time introducing a number of development policies to promote the sharing of space resources and data, encouraging foreign enterprises to invest in the design and manufacturing of civil satellites, and explicitly incorporating the satellite Internet into the scope of the new infrastructural communications network infrastructure.*"[236]

This paragraph provides insights into the underlying logic behind the selection process, offering a form of definition for what is understood by "commercial space" in the report of FutureSpace. It highlights two main aspects: on the one hand, the inclusion of *popular capital* in the construction of civil space infrastructure, and on the other hand, the promotion of resource and data sharing, encouragement of foreign enterprise participation in private satellite ventures, and the integration of satellite internet as part of the new infrastructural communications network.

It is noteworthy that, while this introductory paragraph situates the beginning of Chinese commercial space activities in 2014, the earliest referenced texts date back to 2007. It is possible to make the hypothesis that the choice of 2014 reflects a shift in focus within the texts analyzed below: moving from encouraging non-state investors and entrepreneurs exclusively in the downstream application segment to including more upstream activities, such as satellite manufacturing, which have come to be encompassed under the notion of "participation in civil space infrastructure construction".

"Social capital" doesn't have a literal translation in English. It can be defined as not being central "government capital" [zhengfu touzi 政府投资], but cannot be equated with private capital for a number of public funds in China function as venture capital[237]. Hence, in the

[236] "Commercial Space Development Report 2022 [中国航天发展报告 2022 Zhongguo Hangtian Fazhan Baogao]" (FutureSpace Space Technology Research Institute, 2022). p.13

[237] Hao Chen and Meg Rithmire, 'The Rise of the Investor State: State Capital in the Chinese Economy' (Harvard Business School, 2020).

context of this text, “social capital” can be understood as the diversification in investors and operators from central government capital.

Another term, people capital [民间资本 *minjian ziben*], seems to have a more restricted definition, as can be seen in the introduction of the text “*Fully activate the potential role of social capital, especially people capital*”. However, it is difficult to draw a clear distinction between the two concepts from their use in the rest of the text: for example, article 18, titled “*Encouraging the participation of social capital in electric power construction*”, mentions both people capital for nuclear power equipment, social capital for the construction of clean energy projects. Interestingly, it is this term that is favored for the title dedicated to space: popular capital appears 14 times in the body of the text, among which 8 times in chapter 7.

2014 *Guiding Opinions* thus allows us to formulate a hypothesis regarding the distinction between the terms “social capital”, which may potentially include the guided funds mentioned earlier, and “popular capital”, which appears to be more restrictive.

As we will see in the next Chapter IV, the provisions of the 2014 *Guiding Opinions on Investment and Financing Mechanisms for Innovation in Key Areas to Encourage Social Investment* (hereinafter 2014 *Guiding Opinions*)[238] are rather vague and do not explicitly mention the launcher sector, for example. Nevertheless, this date has become a widely accepted reference point, consistently cited by Chinese and English-speaking specialists as well as interviewees in the launcher sector.

A hypothesis that emerges from the comparison between Chapter II, which analyzes the discourse in academic and specialized literature on China's commercial space sector, and Part 2, which outlines the relevant regulatory framework for these activities, is that the terminology used in the former, as well as the definitions provided, stem from the authors' personal interpretations rather than from primary texts themselves.

A number of key terms—foremost among them *“commercial space”* and *“space commercialization”*, as well as broader concepts such as *“social capital”* and *“popular capital”*—remain undefined in primary regulatory texts. The term *“national space*

[238] State Council, “Guiding Opinions of the State Council on Investment and Financing Mechanisms for Innovation in Key Areas to Encourage Social Investment [国务院关于创新重点领域投融资机制鼓励社会投资的指导意见 Guowuyuan Guanyu Chuangxin Zhongdian Lingyu Tou Rong Zi Jizhi Guli Shehui Touzi de Zhidao Yijian],” Pub. L. No. 国发〔2014〕60 号 (2014), https://www.gov.cn/zhengce/content/2014-11/26/content_9260.htm.

infrastructure" is defined belatedly and in an exceptionally broad manner, as well as a definition for a commercial launch enterprise in 2019, explored in the next Chapter III.

This partly accounts for the definitional controversies identified in Chapter II and, more broadly, for the fact that the selected articles did not always seem to address the same subjects, despite all being categorized under *commercial space*.

One hypothesis for the use of ambiguous terminology by public authorities is that the broad framing of commercial space—as the entry of social and popular capital into various segments of space activity— acts as a mechanism for sectoral exploration, as will be explored in the next Chapter. Regulatory agencies often issue abstract and general policy guidelines without specifying implementation details. This deliberate vagueness is intended to attract a wide range of actors—local governments, investment funds, state-owned enterprises, and minying (private) firms—by allowing room for interpretation, experimentation, and initiative.

The launch sector offers a telling illustration. Although it was not explicitly mentioned in the 2014 *Guiding Opinions*, the sector nonetheless experienced a proliferation of enterprises from that date onward. The regulation of their activities, most notably through the 2019 *Notice on Promoting the Orderly Development of Commercial Launch Vehicles* (hereinafter 2019 *Notice*)[239] only came at a later stage.

The introduction of the commercial space policy section of the FutureSpace 2022 *Report* also touches on other aspects related to commercial space in China: resource and data sharing, the encouragement of foreign enterprise participation in private satellite ventures, and the integration of satellite internet into the new infrastructural communications network.

This reflects the findings of the previous Chapter II: commercial space activities as an "entry of social capital" into the space sector represent a plural reality that encompasses both the private and public sectors, as well as their interactions within the space domain. This includes

[239] "Notice by the State Administration of Science, Technology and Industry for National Defense and the Equipment Development Department of the Central Military Commission on Promoting the Standardized and Orderly Development of Commercial Launch Vehicles [国家国防科技工业局 中央军委装备发展部关于促进商业运载火箭规范有序发展的通知 Guojia Guofang Keji Gongye Ju Zhongyang Junwei Zhuangbei Fazhan Bu Guanyu Cujin Shangye Yunzai Huojian Guifan Youxu Fazhan de Tongzhi]," Pub. L. No. 科工一司〔2019〕647号 (2019), https://www.gov.cn/xinwen/2019-06/17/content_5400951.htm.

the emergence of *minying* enterprises but also the financing of spin-offs from state-owned enterprises through social and public capital, referred to as mixed ownership.

Date	Enacting Organ	Title (English Translation)	Title (Chinese)	Related content
2007/11	State Science and Technology Commission, National Development and Reform Commission (NDRC)	Several Opinions on Promoting the Development of Satellite Application Industry 2007	《关于促进卫星应用产业发展的若干意见》	Acceleration of the development of the satellite application industry is suggested.
2012/06	State Council	Implementation Opinions on Encouraging and Guiding Popular Capital to Enter the Field of National Defense Science and Technology Industry	《关于鼓励和引导民间资本进入国防科技工业领域的实施意见》	Encourage and guide people's capital to enter the national defense science and technology industry in accordance with established principles and fields, and allow private enterprises to participate in weaponry and equipment research and production tasks in compliance with relevant regulations.
2014/11	State Council	Guiding Opinions on on Investment and Financing Mechanisms for Innovation in Key Areas to Encourage Social Investment	《国务院关于创新重点领域投融资机制鼓励社会投资的指导意见》	Encourage private capital to participate in the development of national civil space technology infrastructure.
2015/05	State Council	Made in China 2025	《中国制造 2025》	Regarding accelerating the construction of national civil space infrastructure, efforts will focus on developing new types of satellites and other space platforms and payloads, as well as space-based broadband internet systems, to establish a long-term, stable capability for space information services in satellite remote sensing, communication, and navigation. Promote inhabited spaceflight and lunar exploration projects, while moderately advancing deep space exploration.

				Facilitate the transfer of aerospace technologies and the application of space-based technologies.
2015/07	Ministry of Finance (MOF), NDRC	Notice on Tax Policies Related to Aerospace Development	《关于航天发展相关税收政策问题的通知》	Subjects domestic entities providing space transportation services are to a zero VAT rate policy, with the implementation of a tax exemption and refund mechanism. Spacecraft and related goods delivered in orbit by domestic entities are regarded as exported goods, eligible for the VAT export tax refund policy, with a tax exemption mechanism applied.
2015/10	NDRC	Medium- and Long-Term Development Plan for National Civil Space Infrastructure (2015-2025)	《国家民用空间基础设施中长期发展规划（2015-2025）》	'Promoting diversified investment and industrialized applications' and support private capital investment in satellite development and system construction is suggested.
2016/05	NDRC, Ministry of Industry and Information Technology (MIIT)	Notice on Implementing Major Projects for Manufacturing Upgrading and Transformation	《关于实施制造业升级改造重大工程包的通知》	'Commercial Space Product Development Project' is listed as one of the key projects.
2016/11	State Council	13th Five-Year National Strategic Emerging Industries Development Plan	《“十三五”国家战略性新兴产业发展规划》	During the '13th Five-Year Plan' period, efforts should be made to expand and strengthen the satellite and application industry. By 2020, the construction of a fully functional national civil space infrastructure should be largely completed to meet the main operational needs of various domestic sectors, achieve basic self-reliance in space information applications, and establish a relatively complete satellite and application industry chain.
2016/12	State Council Information’s Bureau	2016 White Paper on China’s Space Activities	《2016 中国的航天》	Advance and improve the access and exit mechanisms, establish a streamlined management system for aerospace investment projects, and encourage and guide private capital and social forces to participate in an orderly manner in

				aerospace research and production, space infrastructure construction, space information product services, satellite cloud operations, and other aerospace activities. Vigorously develop commercial space.
2018/12	State Council, Central Military Commission	Interim Measures on the Management of Remote Sensing Satellite Data Open Sharing	《遥感卫星数据开放共享管理暂行办法》	Relevant regulations on the open sharing of remote sensing satellite data.
2019/05	MIIT	Notice on Further Promoting the Insurance Compensation Mechanism for First (Set) Major Technical Equipment	《关于进一步深入推进首台（套）重大技术装备保险补偿机制试点工作的通知》	Support the resolution of R&D and application bottlenecks caused by initial market trust deficiencies through market-oriented approaches. Promote innovation in major technical equipment.
2019/05	State Administration of Science, Technology and Industry for National Defense (SASTIND), NDRC, MOF	Interim Measures on the Management of National Civil Remote Sensing Data	《国家民用卫星遥感数据管理暂行办法》	Encourage the development of advanced remote sensing data products and the promotion of their commercialization. Support industry associations, academic societies, and other social organizations in promoting the application and services of remote sensing data.
2019/07	SASTIND, Central Military Commission Equipment Development Department	Notice on Promoting the Orderly Development of Commercial Launch Vehicles	《关于促进商业运载火箭规范有序发展的通》	All entities engaged in the research, development, production, testing, transportation, and commercial launch activities of rockets for profit are subject to regulation. This includes not only the two major aerospace groups but also the numerous private enterprises involved in the development of civil rockets.

B. Analysis

1. Multiple Organs

The official texts on commercial space policy analyzed by FutureSpace originate from 6 different organs involved in drafting 13 documents. These comprise civilian and military central executive bodies, ministries, commission as well as lower level specialized administration. The former includes highest level instances, the State Council and Central Military Commission (CMC), with the CMC Equipment Development Department operating as a subordinate department within the CMC. The second includes ministries, namely the Ministry of Industry and Information Technology (MIIT, formerly State Science and Technology Commission), the Ministry of Finance (MOF), as well as the National Development and Reform commission (NDRC) which is a ministerial level commission. All the above entities are under the authority of the State Council. The State Administration for Science, Technology and Industry for National Defense (SASTIND, formerly COSTIND) is a sub-ministerial level specialized administration under the tutelage of the MIIT.

The China National Space Administration (CNSA) is not the issuing organ of any of the documents listed in the FutureSpace report, nor of any text encountered during our research. This underscores its role as a representative body for exchanges with foreign counterparts rather than as a direct policymaker or regulator.

In the texts analyzed in Chapter II, the fragmented nature of leadership in the Chinese space sector has been identified by several authors as an obstacle to the development of commercial space activities—a situation sometimes referred to as "nine dragons controlling the river" [九龙治水 *jiu long zhi shui*]. This issue is also extensively documented by English-language authors studying China's space sector presented in introduction.

The selection of texts compiled by FutureSpace indeed reflects those criticisms, as a significant plurality of organs is involved in the drafting process. Several texts, while drafted by the State Council or its Information Bureau, probably involved the cooperation of several organs, such as *White Papers* or *Made in China 2025* Strategy. Also, the perimeter for each organ remains unclear. For example, in 2018 the State Council, Central Military Commission enacted the *Interim Measures on the Management of Remote Sensing Satellite Data Open Sharing*. One year later, SASTIND, NDRC and MOF published *Interim Measures on the Management of National Civil Remote Sensing Data*. This could imply that a multiplicity of organs has some

authority in the management of remote sensing data. Furthermore, while a number of texts are co-authored by multiple entities, the opacity surrounding the roles of these bodies means that there is little indication of how they coordinate their actions.

In the following box, a brief overview of organs that have enacted texts related to commercial space in the FutureSpace compilation is provided in order to formulate some hypotheses about the crossroad nature of Chinese commercial space activities based on the mandates of the different organizations involved.

A more in-depth study of the role of these bodies, based on specialized literature outside of space-related literature works, could offer interesting avenues for future research. This would help to better understand the formulation of policies in China's commercial space sector, which is often examined solely from a legal perspective.

The State Council is China's chief administrative authority. In the space sector, it is the key organ at the administrative level, for it supervises the functioning and coordination of all actors involved whatever their place in the administrative hierarchy: ministries and bureaus, along with major SOEs, such as CASC and CASIC. The State Council's Information Bureau publishes the five-year space plan as a Government White Paper, outlining medium-term space strategy[240].

The CMC exercises leadership over the PLA. Space matter within the military were originally a part of General Equipment Department (GED) prerogative as a special strategic program[241]. Following major reconfiguration of the PLA's organization in 2016, the GED was reorganized and some of space activities within the army were placed under the Space Systems Department of the newly created Strategic Support Force (PLASSF), responsible for armament programs, military space systems, management of bases and control of launch assets[242].

The NDRC is a macroeconomic management agency responsible for formulating policies related to economic and social development. Within the context of space activities, the NDRC could play a role in shaping industrial policies, guiding investment in strategic sectors, and

[240] Ibid, p122.
[241] I. Sourbès Verger, D. Borel, *La Chine, un empire très céleste*, Dunod, 2008, p. 67.
[242] M. Julienne, The Sky is the limit: China's ambitions in space, IFRI, 20 January 2021, p. 6.

ensuring the integration of space-related industries into broader economic plans such as the National Five-Year Plans.

The MIIT oversees China's industrial and information technology sectors, coordinating policies and regulations inter alia to advance technological innovation and industrial development. Within the space domain, MIIT's responsibilities could include managing the industrial planning and technological standardization of the space sector. It supervises SASTIND, which handles regulatory and coordination tasks for space activities, and ensures alignment with China's broader industrial strategies.

The MOF is responsible for formulating and implementing fiscal and budgetary policies, including managing state revenues, expenditures, and public financial resources, to support national development goals. As a coordinating body for funding and financial planning, the MOF frequently collaborates with other ministries, commissions, and specialized agencies, notably NDRC and MIIT in the case of commercial space. The MOF plays a central role in shaping fiscal policies—particularly taxation and budgetary support—which are key tools for encouraging private sector participation in aerospace activities.

SASTIND is an office of the Ministry of Industry and Information Technology (MIIT), which was created in 2008 during administrative reform that also led to the dissolution of COSTIND[243]. It inherited part of COSTIND's prerogatives at a lower political level, including coordination and management of space matters, industrial planning and the regulation of the space industry.

The Commission for Science, Technology and Industry for National Defense (COSTIND) was set up in 1982 under direct control of the state council. At the head of the defense industry, it was in charge of research and formulation of policies, strategies, regulatory and management rules for defense industry and technology sector, including air, space and nuclear sectors. China National Space Agency (CNSA), created in 1993 was placed under its authority[244].

[243] M. Aliberti, op. cit., p.11

[244] B. Harvey, *China in Space: The Great Leap Forward*, 2nd ed., Springer International Publishing, 2019, https://doi.org/10.1007/978-3-030-19588-5., p152.

Among those involved in the drafting of more than one text, two are among the highest-level bodies within the state, and the military: the State Council, and the Central Military Commission. None of these bodies is exclusively dedicated to space.

This reality is reflected in the scope of the texts drafted by the State Council, which is very broad, with several seeking to integrate space activities into other existing policies and national level strategy such as 2015 *Made in China 2025*[245] or 2016 *13th Five-Year National Strategic Emerging Industries Development Plan*[246].

However, the CMC is involved as a co-author of documents addressing fairly concrete and specific topics, such as the sharing of remote sensing data and development. Examples include: 2018 *Interim Measures on the Management of Remote Sensing Satellite Data Open Sharing*[247]*;* 2019 *Notice on Promoting the Orderly Development of Commercial Launch Vehicles*[248].

The NDRC, MIIT and MOF operate under the authority of the State Council. The strong presence of these ministries positions commercial space as a theme that is simultaneously economic, developmental and technological in nature. NDRC and MOF texts do have an economic policy flavor, such as 2015 *Notice on Tax Policies Related to Aerospace Development*[249]. The NDRC also oversees planning, which aligns with the programmatic focus of *2015 Medium- and Long-Term Development Plan for National Civil Space Infrastructure*[250] or 2016 *Notice on Implementing Major Projects for Manufacturing Upgrading and Transformation*[251].

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[245] "Notice of the State Council on the Publication of 'Made in China 2025' [国务院关于印发《中国制造 2025》的通知 Guowuyuan Guanyu Yinfa Zhongguo Zhizao 2025 de Tongzhi]," Pub. L. No. 国发〔2015〕28 号 (2015).
[246] State Council, "Notice of the State Council on the Issuance of the '13th Five-Year' National Strategic Emerging Industries Development Plan [国务院关于印发'十三五'国家战略性新兴产业发展规划的通知 Guowuyuan Guanyu Yinfa 'Shisan Wu' Guojia Zhanluexing Xinxing Chanye Fazhan Guihua de Tongzhi]," Pub. L. No. 国发〔2016〕67 号 (2016), https://www.gov.cn/zhengce/content/2016-12/19/content_5150090.htm.
[247] The original text could not be retrieved.
[248] Notice by the State Administration of Science, Technology and Industry for National Defense and the Equipment Development Department of the Central Military Commission on Promoting the Standardized and Orderly Development of Commercial Launch Vehicles [国家国防科技工业局 中央军委装备发展部关于促进商业运载火箭规范有序发展的通知 guojia guofang keji gongye ju zhongyang junwei zhuangbei fazhan bu guanyu cujin shangye yunzai huojian guifan youxu fazhan de tongzhi].
[249] The original text could not be retrieved.
[250] National Development and Reform Comission, "Medium- and Long-Term Development Plan for National Civil Space Infrastructure (2015–2025) [《国家民用空间基础设施中长期发展规划（2015-2025）》 Guojia Minyong Kongjian Jichu Sheshi Zhong Chang Qi Fazhan Guihua (2015–2025)]" (n.d.).
[251] "Notice by the National Development and Reform Commission and the Ministry of Industry and Information Technology on the Implementation of the Major Project Package for the Upgrading and Transformation of the Manufacturing Industry [国家发展改革委工业和信息化部关于实施制造业升级改造重大工程包的通知

The list of texts compiled by FutureSpace originates primarily from five entities: two at the central level and three at the ministerial level under the authority of the State Council. The areas of activity of these various entities allow us to remark that the space sector occupies a crossroads position, situated at the intersection of the mandates of different organizations and the convergence of technological, scientific, military, and economic policies—an intersection that is often underestimated in the English-language literature presented in Introduction.

On this latter point, the texts in the list highlight that commercial space is consistently embedded in policies targeting specific sectors in order to foster economic development. Additionally, texts that do not explicitly address space can be seen as general policies aimed at developing specific sectors with high growth potential such as key innovation areas, high-end manufacturing, strategic emerging industries. These policies designate commercial space as a priority domain and propose mechanisms for its development, including the introduction of social and popular capital.

2. Scattered Regulatory Framework

Space policy corpus at large has been described as characterized by a lack of binding force, and rather low status the hierarchy of norms in the PRC[252]. The absence of a clear *legal* framework is quoted, both by local professionals of the sector and foreign analysts. However, a number of regulatory and programmatic provision exist that are relevant to Chinese space industry and emerging commercial space sector.

The selection of texts relevant to Chinese commercial space policy compiled by FutureSpace consists of instruments of various nature. Given the challenges in clearly identifying the nature and scope of these primary texts through available sources, an organizational framework is proposed below, based on the analysis of the texts. Five types of texts were identified: four "Opinions", four "Notice", three "Plans" [253], one "White Paper", two "Interim Measures".

Their position within the PRC legal order and their scope can be organized as follows:

Guojia Fazhan Gaige Wei Gongye He Xinxi Hua Bu Guanyu Shishi Zhizao Ye Shengji Gaizao Zhongda Gongcheng Bao de Tongzhi]," Pub. L. No. 发改产业〔2016〕1055 号 (2016), https://www.gov.cn/xinwen/2016-05/18/content_5074373.htm.

[252] Fabio Tronchetti, 'Space Law and Chiiet al. p14u na', Oxford Research Encyclopedia of Planetary Science, 25 February 2019, https://doi.org/10.1093/acrefore/9780190647926.013.66.Zhao, *National Space Law in China*.p.23

[253] *Made in China 2015* is not identified in the list, it was decided to qualify it as a "plan"

"Guiding Opinions" emanate from the highest instances of political power, giving broad national political orientations to the destination of lower instances, in particular local governments. While they do not have a binding effect, they are authoritative and shape the actions of ministries and subordinate agencies. They also give insight as to national political priorities and how these interact with one another[254].

"Opinions" express the stance or approach of a government body on specific issues or sectors. These are guiding documents, serving as policy direction rather than enforceable regulations.

"Implementation opinions" provide detailed guidance on how to execute policies, regulations, or strategic decisions.

"Plans" set goals, priorities, and guidelines for specific industries or areas within a defined timeline.

"Notice" are administrative texts stemming from a hierarchically higher agency to its subordinate agencies. They communicate specific decisions, measures, or actions to be taken by subordinate bodies and are meant for direct application.

"Measures" establish rules and procedures for implementing laws or policies within a specific sector or activity. "Interim measures" are a type of text that is usually enacted in order to address rapidly a pressing issue[255].

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[254] A good example for that in the space sector are 2016 *Guiding Opinions on Encouraging the Construction of the Belt and Road Space information Corridor* that links together two national priorities of the time: the Belt and Road initiative, the Going Out policy and the development of a commercial space sector 关于加快推进"一带一路"空间信息走廊建设与应用的指导意见》Guiding Opinions on the Construction and Implementation of the "Belt and Road" Spatial Information Corridor, Administration for Science, Technology and Industry for National Defense, Development and Reform Commission, 22 October 2016, https://www.ndrc.gov.cn/fzggw/jgsj/kfs/sjdt/201611/t20161123_1086163.html. L. Sénéchal-Perrouault, Le couloir d'information spatiale des nouvelles routes de la soie: ambitions et réalités, Asia Centre, 18 August 2020, https://centreasia.eu/le-couloir-dinformation-spatial-des-nouvelles-routes-de-la-soie-ambitions-et-realites/.
N.Rolland Ed., « The Space and Cyberspace Components of the Belt and Road Initiative » (The National Bureau of Asian Research (NBR), 3 September 2019), https://www.nbr.org/publication/the-space-and-cyberspace-components-of-the-belt-and-road-initiative/.J.Dotson, « The Beidou Satellite Network and the "Space Silk Road" in Eurasia », *The Jamestown Foundation*, 15 July 2020, https://jamestown.org/program/the-beidou-satellite-network-and-the-space-silk-road-in-eurasia/.

[255] Note that their 'interim' or 'provisional' (*zanxing* 暂行) character does not necessarily imply that they lifespan is short. In this case, 2002 *Interim Measures* are still in force. Another proverbial example are the *Interim Regulations of People's Republic of China on Private Enterprises*, enacted in 1988 and only abrogated in 2016. *Zhonghua renmin gongheguo siying qiye zhanxing tiaoli* 中华人民共和国私营企业暂行条例 Provisional Regulations of the People's Republic of China on Private Enterprises, State Council of the People's Republic of China, June 3rd 1988. . For a detailed account of the 2002 *Interim Measures* from a legal point of view, see Fabio

"White Papers" are government-issued texts used to explain policies, progress, or goals to both domestic and international audiences. While they articulate policy priorities, they are not legally binding.

Policies on the list of policies compiled by FutureSpace show a diversity of scope. A few texts tackle the space sector in an all-encompassing fashion, notably the successive *White Papers on China Space Activities* which are presented in the next Chapter IV. Thus, out of the list of 13 texts, only 5 specifically address space-related issues. Some go way beyond this single topic and concern nationwide strategy, such as 2015 *"Made in China"*. Others, on the contrary, tackle more defined areas such as 2019 *Notice on Promoting the Orderly Development of Commercial Launch Vehicles* address very precise issues, for instance, taxation and insurance policies.

This situation may be linked to the critique made by Feng and Gao presented in the previous Chapter II, regarding the legal framework for space activities in China: "*presenting multiple macro regulations but no specific and clear rules*" for the former[256], presenting "*an accumulation of rules that can be applied to space" and "numerous texts, but not specialized*" for the latter[257].

A number of texts do not specifically address space but include it within broader actions: 2012 *Implementation Opinions on Encouraging and Guiding Private Capital to Enter the Field of National Defense Science and Technology Industry*; *Made in China 2025* (2015)[258]; the 2016 *Notice on Implementing Major Projects for Manufacturing Upgrading and Transformation*[259]; and the 2016 *13th Five-Year National Strategic Emerging Industries Development Plan*[260]. This is also the case for the 2014 *Guiding Opinions on Investment and Financing Mechanisms for*

Tronchetti, « Space Law and China », Oxford Research Encyclopedia of Planetary Science, 25 February 2019, https://doi.org/10.1093/acrefore/9780190647926.013.66.

[256] Feng, "Discussing the Construction of China Commercial Space Legal System [lun zhongguo shangye hangtian de falv tixi goujian] 论中国商业航天的法律体系构建."

[257] Gao, "An Analysis of the Domestic Legal Situation Based upon the Legislation of China's Space Law [woguo hangtian fali fasuo yituo de guonei falv huanjing fenxi] 我国航天法立法所依托的国内法律环境分析."

[258] Notice of the State Council on the Publication of "Made in China 2025" [国务院关于印发《中国制造 2025》的通知 guowuyuan guanyu yinfa zhongguo zhizao 2025 de tongzhi].

[259] Notice by the National Development and Reform Commission and the Ministry of Industry and Information Technology on the Implementation of the Major Project Package for the Upgrading and Transformation of the Manufacturing Industry [国家发展改革委工业和信息化部关于实施制造业升级改造重大工程包的通知 guojia fazhan gaige wei gongye he xinxi hua bu guanyu shishi zhizao ye shengji gaizao zhongda gongcheng bao de tongzhi].

[260] State Council, Notice of the State Council on the Issuance of the "13th Five-Year" National Strategic Emerging Industries Development Plan [国务院关于印发"十三五"国家战略性新兴产业发展规划的通知 guowuyuan guanyu yinfa "shisan wu" guojia zhanluexing xinxing chanye fazhan guihua de tongzhi].

Innovation in Key Areas to Encourage Social Investment[261], widely regarded as the starting point for the new era of commercial space, which is presented in detail in the next Chapter IV.

Similar objectives and mechanisms in these broad-reaching policy texts can be observed. Indeed, all of them identify priority sectors for the country's development, whether in the national defense science and technology industry, high-end manufacturing, or emerging industries. The entry of private capital is designated as one of several tools to foster the growth of these sectors. echoes certain aspects of Barry Naughton's analysis of Chinese industrial policy[262].

The nature of these texts is not always correlated with their scope. While *Plans* tend to have a broad reach in general, the 2007 *Opinions* focuses on a specific topic—satellite applications—while the 2016 *Notice* on manufacturing upgrading has a relatively broad and cross-industry scope.

3. *Commercial Space in Policies: Encouraging Social and Popular Capital in Downstream Sector from the Mid-2000s, to the Upstream and the Launch in the mid-2014*

The relevant provisions of the texts in the corpus and their overall objective inform us about the evolution of the role and scope of commercial space in the policy and regulatory, allowing us to draw parallels or, conversely, identify breaks with the findings of Chapter II.

It is interesting to note that, in the list of texts compiled by FutureSpace, the first document, *Several Opinions on Promoting the Development of Satellite Application Industry*[263] was published in 2007. This starting point is notable in light of the findings in the Part 1 of this dissertation. Indeed, to use the distinction made by Liu Yufei, it aligns neither with the *commercialization* initiated in the 1980s, particularly through the entry of space launch services

[261] State Council, Guiding Opinions of the State Council on Investment and Financing Mechanisms for Innovation in Key Areas to Encourage Social Investment [国务院关于创新重点领域投融资机制鼓励社会投资的指导意见 guowuyuan guanyu chuangxin zhongdian lingyu tou rong zi jizhi guli shehui touzi de zhidao yijian].
[262] Barry Naughton, *The Rise of China's Industrial Policy, 1978 to 2020* (México: Union de Universidades de America Latina y El Caribe, 2021).
[263] National Development and Reform Comission, "Medium- and Long-Term Development Plan for National Civil Space Infrastructure (2015–2025) [《国家民用空间基础设施中长期发展规划（2015-2025）》 Guojia Minyong Kongjian Jichu Sheshi Zhong Chang Qi Fazhan Guihua (2015–2025)]" (n.d.).

into the international market, nor with "commercial space", which is generally dated to the mid-2010s.

2007 *Several Opinions* indeed encourage the entry of social capital into the field of satellite applications:

"*Encourage social investment and enterprise participation in satellite applications - The state and local governments at all levels provide investment subsidies or loan interest discounts for major satellite application projects that have industrialization prospects, are included in national development plans, and are primarily funded by enterprises. Through the establishment of a supportive policy environment, social investment is actively guided to develop the satellite application industry, promoting diversification of investment entities."*[264]

Thus, this text brings out an important nuance compared to the chronologies established by the authors in Chapter II: commercial space, understood as the *entry of non-state and private capital into space activities*, did not begin in the mid-2010s but earlier. However, it is possible that the authors define the true emergence of commercial space only as *the expansion of this diversification of investors to the upstream segment of space activities*, including satellite manufacturing, which only occurred later. This longer-term existence of common policy mechanisms in the space sector at large also calls into question the common narrative that *commercial space* is a recent phenomenon in the PRC, and that the country is a latecomer in commercial space activity. It allows to create a continuity between *space commercialization,* which came to a turn in the 2000s and *commercial space*, which started emerging right after, as is further exemplified in the *White Papers* in the next Chapter IV.

The focus of subsequent text on the list is the entry of popular capital into the field of defense. While it makes no mention of space, the 2012 *Implementation Opinions on Encouraging and Guiding Popular Capital to Enter the Field of National Defense Science and Technology Industry*[265] does encourage the entry of social capital in the development of weapon systems and of dual-use (civil-military) technologies. A system of authorization licensing under the

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[264] State Science and Technology Commission, National Development and Reform Commission (NDRC), "Several Opinions on Promoting the Development of Satellite Application Industry 2007 [关于促进卫星应用产业发展的若干意见 Guanyu Cujin Weixing Yingyong Chanye Fazhan de Ruogan Yijian]" (2007), https://www.ndrc.gov.cn/fggz/fzzlgh/gjjzxgh/200806/P020191104623838861762.pdf.

[265] "Implementation Opinions on Encouraging and Guiding Private Capital to Enter the Field of Defense Science, Technology, and Industry [关于鼓励和引导民间资本进入国防科技工业领域的实施意见 Guanyu Guli He Yindao Minjian Ziben Jinru Guofang Keji Gongye Lingyu de Shishi Yijian]," Pub. L. No. 科工计〔2012〕733号 (2012), https://www.gov.cn/zhengce/2016-05/22/content_5075643.htm.

aegis of SASTIND, is also mentioned, re-employed in 2019 *Notice on Promoting the Orderly Development of Commercial Launch Vehicles*.

The 2012 *Implementation Opinions* also encourage the entry of popular capital in four areas:

"*The areas where private capital is allowed to enter the national defense science and technology industry include: weaponry research and production, investment and construction in the national defense science and technology industry, restructuring and reform of military-industrial enterprises, and the development of dual-use technologies*."

Thus, the 2012 *Implementation Opinions* echoe the role played by civil-military integration in its twofold aspects: on the one hand, the emergence of *minying* enterprises in new sectors; on the other, the mixed-ownership reform of state-owned enterprises in the military industry, which includes CASC and CASIC. Thus, it relates to the mixed-ownership reform of state-owned enterprises, a concept emphasized by Liu Yufei in Chapter II. Additionally, it highlights the use of popular capital to finance projects, technologies, and infrastructure.

The *2014 Guiding Opinions on Investment and Financing Mechanisms for Innovation in Key Areas to Encourage Social Investment* is analyzed in detail in the following subsection. Notably, the text includes the following provisions:

"*Encourage "people's capital" to participate in the construction of national civil space infrastructure - Improve the civilian remote sensing satellite data policy. Strengthen government procurement services. Encourage people's capital to develop, launch and operate commercial remote sensing satellites. Provide professional and market-oriented services. Guide people's capital to participate in the construction of satellite navigation ground application systems*."[266]

In a section titled *Energetically promote breakthrough development in key fields*, *Made in China 2025* strategy mentions aviation aerospace equipment. While "national civil space infrastructure" appears again, commercial space is not mentioned.

[266] State Council, Guiding Opinions of the State Council on Investment and Financing Mechanisms for Innovation in Key Areas to Encourage Social Investment [国务院关于创新重点领域投融资机制鼓励社会投资的指导意见 guowuyuan guanyu chuangxin zhongdian lingyu tou rong zi jizhi guli shehui touzi de zhidao yijian].

"*Aerospace equipment: Develop a new generation of carrier rockets and heavy-duty launch vehicles to improve the ability to enter space. Accelerate the construction of national civilian space infrastructure, develop new satellites and other space platforms and payloads and space-to-ground broadband internet systems, and form long-term, sustainable, and stable satellite remote sensing, communication, navigation, and other space information service capabilities. Promote manned spaceflight and lunar exploration projects, and develop deep space exploration as appropriate. Promote the transformation of space technology and the application of space technology."*[267]

The *2015 Medium- and Long-Term Development Plan for National Civil Space Infrastructure (2015-2025)* gives a definition of "national civil space infrastructure" as:

"*Civil space infrastructure refers to integrated space-ground engineering facilities that utilize space resources to primarily provide users with remote sensing, communication broadcasting, navigation positioning, and other products and services. It consists of functionally complementary space systems, ground systems, and their associated systems that operate continuously and stably.*" [268]

Encompassing space and ground systems for communications, navigation, and Earth observation, this is a broad concept that can, in practice, include almost all non-scientific and non-exploratory space activities. In the readings conducted for Chapter II, we also observed the polysemous nature of the term "infrastructure" or "space infrastructure", which is used differently by various authors to convey distinct ideas.

The text also specifies:

"*Explore new mechanisms for marketization and commercialization of national civil space infrastructure, support and guide popular capital to participate in the construction and application development of national civil space infrastructure.*"

By using the term "construction" and staging it in contrast to "applications" the plan could be expanding the participation of non-state capital in the upstream segment of space activities,

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[267] Notice of the State Council on the Publication of "Made in China 2025" [国务院关于印发《中国制造 2025》的通知 guowuyuan guanyu yinfa zhongguo zhizao 2025 de tongzhi].
[268] National Development and Reform Comission, Medium- and Long-Term Development Plan for National Civil Space Infrastructure (2015–2025) [《国家民用空间基础设施中长期发展规划（2015-2025）》 guojia minyong kongjian jichu sheshi zhong chang qi fazhan guihua (2015–2025)].

including satellite manufacturing and, more speculatively, launch services—though this remains implicit rather than explicit.

Chapter Conclusion

The broad scope of the concept of "national civil space infrastructure" on the one hand, and the ambiguity surrounding the "participation in the construction" of it encouraged by central authorities on the other, along with the wording of this provision, suggest a hypothesis. By not explicitly defining the scope of the texts or the specific mechanisms being encouraged, China's policies on commercial space could be operating in an exploratory fashion.

The texts in the FutureSpace compilation concerning commercial space, some of which, as we have seen, have a very broad scope and originate from central bodies, provide general directions in which various actors, including local governments, funds and enterprises of various nature, can engage. Subsequently, more detailed regulations are issued to govern the activities of the enterprises that successfully emerge. This is particularly clear at the provincial level, where a significant number of policies have been adopted—leading one interviewee to remark that there is "a commercial space sector for each province" (exchange no. 1, Chapter VII).

The vagueness identified in the framework gathered by FutureSpace, echoing widely spread criticism on the framework for commercial space activities in China, could in fact serve an exploratory purpose in tune with the role of the organs that draft it, conveying general directions for central authorities, while allowing a certain leeway in interpretation and implementation, notably at the industry and provincial level.

The launch sector is not explicitly mentioned in the texts until 2016, which did not prevent the creation of *minying* launcher companies as early as 2014, operating in a context of regulatory ambiguity.

2016 *Notice on Implementing Major Projects for Manufacturing Upgrading and Transformation* aims at the enhancement of China's manufacturing sector through various key projects one of them being aerospace capacity-building projects. This includes a component encouraging the commercial sector, explicitly mentioning the entry of private capital into the upstream segment: "*Focus on the development of production lines for commercial remote sensing satellites, communication satellites, and launch vehicles, significantly enhancing the*

manufacturing capabilities of commercial space products and promoting the marketization of the space industry […]"[269]

The *13th Five-Year Plan for National Strategic Emerging Industries Development*, does not explicitly mention "commercial space" nor "space commercialization". However, it does reference the promotion of commercial satellites in a paragraph dedicated to satellite applications under the subtitle *Promoting Breakthrough Development in High-End Equipment and New Materials Industries to Lead a New Leap in Chinese Manufacturing.* The text states: *"Promote the development of commercial satellites and their commercialization"*[270]. It also touches on concepts related to the integration of the military and civilian sectors, as well as public-private partnership (PPP) initiatives that could potentially apply to other areas of space activities, though this is not explicitly detailed.

Commercial launch vehicles were finally the subject of a dedicated text in July 2019, the *Notice on Encouraging the Development of Market Launch Carrier Rockets in an Orderly Way*[271]. The provisions of this text are examined in detail in the following chapter IV.

Texts with a narrower focus tend to concentrate on applications and remote sensing data sharing, primarily within the downstream sector, while potentially extending to certain upstream activities, particularly in the satellite segment, such as Earth observation and telecommunications. This list reflects how, in the texts analyzed in the following subsection, the launch vehicle manufacturing and launch sector is treated as a peripheral issue—the latest entrant in the gradual opening of space activities to non-state and private capital.

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[269] Notice by the National Development and Reform Commission and the Ministry of Industry and Information Technology on the Implementation of the Major Project Package for the Upgrading and Transformation of the Manufacturing Industry [国家发展改革委工业和信息化部关于实施制造业升级改造重大工程包的通知 guojia fazhan gaige wei gongye he xinxi hua bu guanyu shishi zhizao ye shengji gaizao zhongda gongcheng bao de tongzhi].

[270] State Council, Notice of the State Council on the Issuance of the "13th Five-Year" National Strategic Emerging Industries Development Plan [国务院关于印发"十三五"国家战略性新兴产业发展规划的通知 guowuyuan guanyu yinfa "shisan wu" guojia zhanluexing xinxing chanye fazhan guihua de tongzhi].

[271] Notice by the State Administration of Science, Technology and Industry for National Defense and the Equipment Development Department of the Central Military Commission on Promoting the Standardized and Orderly Development of Commercial Launch Vehicles [国家国防科技工业局 中央军委装备发展部关于促进商业运载火箭规范有序发展的通知 guojia guofang keji gongye ju zhongyang junwei zhuangbei fazhan bu guanyu cujin shangye yunzai huojian guifan youxu fazhan de tongzhi].

IV. Chapter IV – Study of a selection of Policies for Commercial Space in the Launch Sector

This chapter presents an analysis of key Chinese policy and regulatory texts relevant to the commercial space launch sector. It begins with a review of the *White Papers on China's space activities* published by the State Council Information Office between 2000 and 2022 (A.). These policies provide insight into the evolution of official discourse on commercial space, including both the commercialization of launch services and the emergence of new commercial actors.

The second part of the chapter examines three important policy and regulatory texts: the 2002 *Interim Measures on the Administration of Civil Launch Projects* (B.), the 2014 *Guiding Opinions on Innovative Investment and Financing Mechanisms* (C.), and the 2019 *Notice on the Orderly Development of Commercial Launch Vehicles* (D.). For each text, a synthesis and analysis are provided to clarify their relevance and role in structuring the sector. Together, these policies illustrate the progressive definition of a regulatory framework and policy strategy for commercial launch activities in China.

Main findings

The study of a framework for commercial space launch sector reveals that official texts make no distinction between "space commercialization" and "commercial aerospace", maintaining a degree of ambiguity.

A shift is noticeable in the language used in China's *White Papers* on space activities from 2000 and 2006. In the 2000 *White Paper*, the commercialization of Long March launch services for foreign satellites is mentioned several times and presented as a priority, with the figure of 27 launches since 1985 highlighted twice. In contrast, the 2006 *White Paper* mentions only one such launch, alongside two other projects. The commercialization of Long March launch services is referenced only in this one provision. This evolution in the use of terms can be interpreted as reflecting the loss of a segment of the international market for China, namely the market for launching foreign-manufactured satellites.

The 2002 *Interim Measures*, although adopted after the U.S. export restrictions, are more closely tied to the context of the commercialization of Long March launch vehicle services. They align with the country's obligations under international law and the increased transparency required as part of its accession to the WTO. It is possible that the hiatus can be attributed to a

lengthy adoption process for the text, which lagged behind the evolution of the country's access to the international launch services market.

Subsequent *White Papers* increasingly use the term “commercial” to refer to the manufacturing and use of satellites by domestic companies, initially in the telecommunications sector and, gradually over the 2010s, in the fields of remote sensing and navigation. This grouping is labeled “National Civilian Space Infrastructure” by the middle of the decade. A new definition of commercial space emerges, more strongly oriented toward the domestic market and satellite data applications. The stakeholder in this market can include private companies.

Such orientations also align with international trends and could be explained by a desire on the part of public authorities to encourage the involvement, particularly financial, of private companies in the most lucrative areas of space activities. This allows for a partial alleviation of the economic burden these upstream sectors represent. This intent is evident in the “diversification of financing channels” advocated by public authorities in successive *White Papers*. From the middle of the decade, private companies have been increasingly called upon to contribute to space activities, particularly to foster innovation.

At the same time, China’s international space launch services shifted to a new model, progressively offering “turnkey” solutions for placing Chinese-developed satellites into orbit. These services were made accessible, among other clients, to countries also under American embargo.

From that point onward, the space sector became part of a broader governmental strategy to foster collaboration between private companies and the state in designated priority areas, as exemplified by the 2014 *Guiding Opinions*. While launch vehicles were not explicitly mentioned until 2019, this broader opening to new investors and operators in related fields paved the way for the emergence of new enterprises, which are examined in the following section.

The evolution of the status granted to commercial space in policies, notably the shift from a brief mention in a broader economic text in the 2014 *Guiding Opinions* to more specific texts, particularly for launch vehicles and later for satellites, can be interpreted as a change in the government's approach. This shift could reflect a transition from an exploratory stance toward the entry of new actors in the space industry to a framework that regulates these actors in sectors that have experienced growth without necessarily being anticipated by the initial policies.

The subsections dedicated to the 2002 *Interim Measures*, 2014 *Guiding Opinions*, and the 2019 *Notice* reveals that until recently, the manufacturing of launch vehicles and the provision of launch services by private and mixed commercial enterprises were minimally regulated by official texts (B. C. and D.). Indeed, the development of new models by private and mixed enterprises, and their entry into the primarily domestic market, was not anticipated by the initial framework of the 2002 *Interim Measures*, which were more focused on regulating the commercialization of Long March launch services for foreign clients. Launch activities by new commercial space enterprises, which started to be created in the mid 2010s, on the other hand, operated within a vague and poorly adapted framework until a specific *Notice* addressed the issue in 2019. Thus, examining the evolution of the policy framework relevant to commercial space launches in China highlights that this first wave of enterprise creation was largely bottom-up, aligning with insights gathered from interviews.

A. Commercial Space in White Papers on Chinese Space Activities

In this section, the relevant provisions of the five successive *White Papers on China's Space Activities* are reviewed, using the original texts and their official translations released respectively in 2000, 2006, 2011, 2016, and 2022 by the State Council Information Office[272].

The *White Papers* were chosen because they provide a high-level overview of space activities in a broad sense. This allows to use them as a mean to situate commercial activities, in particular the launch sector within the broader context of space activities. Furthermore, published every five years since 2000 with a largely consistent structure, the *White Papers* offer regular benchmarks to trace the evolution of the role and meaning of both space commercialization and commercial space.

In this subsection, the aim is not to analyze the entirety of the *White Papers*, which are addressed in the existing literature[273] and fall outside the scope of this dissertation. Instead, the

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[272] State Council Information Office, "White Paper: China's Space Activities (2000 Edition) [《中国的航天》白皮书 (2000 年版) Zhongguo de Hangtian Baipishu 2000 Nian Ban]" (2000), 2000, https://www.cnsa.gov.cn/n6758823/n6758844/n6760320/n6760325/n6760326/c6813150/content.html; "2000 China's Space Activities - Official Translation," December 1, 2000, http://www.china.org.cn/e-white/8/index.htm; State Council Information Office, "White Paper: China's Space Activities in 2006 [《2006 年中国的航天》白皮书 2006 Nian Zhongguo de Hangtian Baipishu]" (2006), https://www.cnsa.gov.cn/n6758823/n6758844/n6760320/n6760325/n6760326/c6813149/content.html; "China's Space Activities in 2006 - Official Translation," December 12, 2006, https://www.cnsa.gov.cn/english/n6465645/n6465648/c6477657/content.html; State Council Information Office, "White Paper: China's Space Activities in 2011 [《2011 年中国的航天》白皮书 2011 Nian Zhongguo de Hangtian Baipishu]" (2011), 2011, https://www.cnsa.gov.cn/n6758823/n6758844/n6760320/n6760325/n6760326/c6813148/content.html; "China's Space Activities in 2011 - Official Translation," December 29, 2011, http://www.china.org.cn/government/whitepaper/node_7145648.htm; State Council Information Office, "White Paper: China's Space Activities in 2016 [《2016 中国的航天》白皮书 2016 Zhongguo de Hangtian Baipishu]" (2016), 2016, https://www.cnsa.gov.cn/n6758823/n6758844/n6760320/n6760325/n6760326/c6813147/content.html; "Full Text of White Paper on China's Space Activities in 2016 - Official Translation," December 28, 2016, https://english.www.gov.cn/archive/white_paper/2016/12/28/content_281475527159496.htm; State Council Information Office, "White Paper: China's Space Activities in 2021 [《2021 中国的航天》白皮书 2021 Zhongguo de Hangtian Baipishu]" (2022), https://www.cnsa.gov.cn/n6758823/n6758844/n6760320/n6760321/c6813117/content.html; "China's Space Program: A 2021 Perspective - Official Translation," January 28, 2022, https://www.cnsa.gov.cn/english/n6465684/n6760328/n6760329/c6813161/content.html.

[273] Ajey Lele and Gunjan Singh, "China's White Papers on Space: An Analysis," IDSA Issue Brief (Institute for Defense Studies and Analyses, January 20, 2012), https://idsa.in/system/files/IB_ChinasWhitePapersonSpaceAnAnalysis.pdf.K. Stetsiuk, "Chinese Space Policy Narrative in 2000–2022: Comparative Analysis of Five White Papers on Space," *Chinese studies [Китаєзнавчі дослідження]*, no. 2 (September 26, 2023): 19–31, https://doi.org/10.51198/chinesest2023.02.019.IICong Zhao, "China Issues White Paper on Space Activities," *Aerospace China*, 2017, http://www.zghtywbjournal.com/EN/lexeme/showArticleByLexeme.do?articleID=138.

focus is on extracting relevant elements for our research on commercial space activities, particularly in the field of launches, and see if it is coherent with findings from other sources.

It is notable that the elements related to commercial spaceflight contained in the *White Papers* reflect the findings of Part 1 of this dissertation. The term "commercial" used interchangeably with "commercialization" in both the original version and official English translation, lacks a clear definition. This reinforces the hypothesis raised in the previous section regarding the choice of words and their definition, which is not given in the primary sources but rather defined by analysts, explaining for divergence in definition.

The *White Papers* from 2000 and 2022 contain the highest number of mentions of the term "commercialization" and "commercial". Concerning launch activities, commercial launch services from Long March Rockets are present all along, while commercial launch vehicles only appear in 2022 White Paper. Concerning application, the range of data that is subjected to commercial use, be it actual or projected, is extensive.

The 2000 *White Paper* primarily refers to what, using the typology made by Liu Yufei, would be classified as the "commercialization" of Long March launch services on the international market. While maintaining a stable presence across under the heading of international cooperation, it loses prominence in the subsequent *White Papers* of 2006, 2011, and 2016. During this period, however, the term "commercial" begins to describe space applications, particularly telecommunications, and later progressively includes observation and geo-positioning, collectively forming a "space infrastructure"[274]. In 2016, the diversification of investment sources is mentioned.

In 2022 *White Paper*, launchers from both SOEs and private enterprises are explicitly referred to as "commercial launchers". This is also the first *White Paper* on space activities to dedicate a subsection of a normative, as opposed to descriptive, nature to "commercial space". Thus, the scope of "commercial launches" expands over successive *White Papers* without being explicitly clarified.

[274] See 2015-2025 *Medium- and Long-term Development Plan for National Civil Space Infrastructure*

1. Synthesis

The *White Papers* on space activities, published by the Information Office of the State Council, serve as a policy guideline outlining the country's strategic objectives and programmatic intentions for the space sector over a five-year period. These documents highlight major developments in the preceding five years and set forth priorities for the upcoming period.

China's space activities are planned and executed within the framework of the country's Five-Year Plans. These plans are discussed and adopted by the Central Committee of the Chinese Communist Party (CCP) and subsequently ratified by the National People's Congress. They provide a comprehensive blueprint for national social and economic development, as well as industrial planning in key sectors and regions. The *White Papers* align with these Five-Year Plans, serving as the specific policy documents for the space sector during their respective periods. For example, the 2001, 2006, 2011, 2016, and 2022 *White Papers* correspond to the 10th, 11th, 12th, 13th, and 14th Five-Year Plans, respectively.[275]

The structure of the *White Papers* is generally organized as follows, with slight variations in the phrasing of the titles:

I. Aims and Principles
II. Progress Made in the Last Five Years
III. Major Tasks for the Next Five Years
IV. Development Policies and Measures
V. International Exchanges and Cooperation

The 2022 *White Paper*, however, follows a different structure for its central sections. After Section I, *A New Journey Towards a Strong Space Presence*, which largely mirrors the structure and language of its predecessors, the review of achievements from the past five years and the objectives for the next five years are combined and reorganized thematically:

II. Development of Space Technology and Systems
III. Developing and Expanding the Space Application Industry
IV. Research on Space Science

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Section V, which roughly corresponds in structure to Section IV of the previous *White Papers*, is titled *Modernizing Space Governance*. The *White Paper* concludes with a Section VI, *International Cooperation*.

With the exception of the 2022 *White Paper*, commercial activities did not have a dedicated section in previous editions, but were addressed in scattered provisions. These primarily concerned launch services for Long March series, which were consistently noted in this dissertation, always within the section dedicated to international cooperation, and sometimes under achievements and priorities.

Space applications, which are mention without providing full citations, appear in the sections dedicated to achievements and future priorities; and occasionally financing and governance.

Furthermore, the *White Papers* emphasize the concept of coordinated development and the creation of a clear framework, particularly a space law. Other elements discussed in the Part 3 and 4 of this dissertation are also mentioned, notably the challenges related to talent development and raising public awareness.

2. *"Commercial": From International Launch Services to Applications to Including Launch Vehicles, Reflecting Changing Priorities*

In metric terms, the words "commercial" appear slightly fewer than 10 times per *White Paper* on average in the original version: 11 times in 2000; 7 times in 2006, 2011, and 2016; and 17 times in 2022. The term holds a significantly more prominent place in the first and latest *White Papers*.

It is worth noting that the word "commercialization" appears sporadically — once in both 2006 and 2011, and three times in 2021 — and was included in the counts above. Both the original text and the English translation perpetuate the confusion between "commercialization", as established in Part 1 of this dissertation based on the works of Liu Yufei, and "commercial space". Thus, the content of the *White Papers* also reflects the observations made in the previous Chapter III of this dissertation regarding the definition of terms: the various definitions examined in Chapter II were formulated by the authors themselves and do not originate from primary sources, which remain vague.

In the 2000 White Paper, visible attention is given to commercial space launches for foreign clients. Elements related to it can be found as early as Chapter II, *Present Situation*, dedicated

to the major achievements preceding the first *White Paper*, under the subsection *Space Technology*. This theme recurs in subsequent *White Papers*, albeit in a more limited capacity, notably at the end of the text to list launches conducted for foreign clients under this model

"*Since 1985, when the Chinese government announced putting the "Long-March" rockets into the international commercial launching market, China has launched 27 foreign-made satellites into space, thus acquiring a share of the international commercial launching market*."

"*Launching Sites: China has set up three launching sites – in Jiuquan, Xichang and Taiyuan – which have successfully accomplished various kinds of test flights of launching vehicles and launches of a variety of satellites and experimental spacecraft. China's spacecraft launching sites are capable of making both domestic satellites launches and international commercial launches, and carrying out international space cooperation in other fields*."[276]

Commercial launch services are also mentioned in Section III of the 2000 *White Paper Future Development*, as something that needs to be developed in the next 5 years.

Finally, commercial launches are mentioned in Section V *International Cooperation* under the heading of international cooperation, once again both as achievements and as a priority for the next five years.

"*Commercial Launching Service: Ever since the Chinese government made the declaration in 1985 that China's "Long March" launching vehicles would serve the international market and provide international satellite launching service, up to October 2000, China had successfully launched 27 foreign-made satellites for users in Pakistan, Australia, Sweden, the United States, the Philippines, as well as domestic users. The service of "Long March" launching vehicles in the international satellite launching market is a beneficial supplement to international commercial satellite launching services, and it has provided foreign clients with new options.*"

"*Priority Cooperation Areas: […]– Supporting Chinese space enterprises to participate in international space commercial launching services in line with the principles of equality, equity and reciprocity*."[277]

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[276] "2000 China's Space Activities - Official Translation."
[277] Ibid.

In the 2006 *White Paper*, the concept of commercial launches for foreign clients reappears, however, it is confined to Part 5 on international cooperation. The absence of commercial launch services from Parts 2 and 3, which respectively present major achievements for the past five years and objectives for the next five, likely reflects a decline in the importance of this sector: while the first White Paper mentions 27 satellites launched into orbit via commercial flights, albeit over a 15-year period, only one effective launch is noted in the second *White Paper*. Conversely, the term "commercial" comes to qualify activities related to the use of satellites for national purposes particularly broadcasting and telecommunications satellites in Part 3. *Major Tasks*.

"*Commercial activities: China launched a communications satellite "APSTAR VI" into orbit in April 2005. In December 2004, China signed a commercial contract for a communications satellite with Nigeria, providing in-orbit delivery service to that country. In November 2005, China signed a commercial contract for a communications satellite with Venezuela, providing in-orbit delivery service and associated ground application facilities.*

Priority Cooperation Areas :[…] - Commercial satellite launching services, export of satellites and their components and parts, and construction and services of satellite ground TT&C and application facilities."[278]

The *White Papers* from 2006 onward illustrate the presence of an historical phenomenon of "space commercialization", as established in the research presented in the Introduction and Part 1 of this dissertation. They could also reflect what was described in an interview as its "failure" notably in the face of U.S. control export. They are also telling of the shift in China's international commercial space strategy that occurred, notably the transition from providing launch services for satellites manufactured by third-party states—including the United States or any other country using components subject to ITAR regulations—to the domestic development and launch of satellites for third-party states[279].

Another hypothesis is that the *White Papers* reflect a change in priority toward the national market launch market for satellites, notably in order to foster space applications in

[278] "China's Space Activities in 2006 - Official Translation."
[279] Hugo Meijer, *Trading with the Enemy: The Making of US Export Control Policy toward the People's Republic of China*, Reprint édition (Oxford University Press, 2018).

telecommunication, remote sensing, and navigation which are a constant concern in the subsequent *White Papers*

The 2011 *White Paper* also allocates space to the commercialization of launch services in Section V. *International Exchanges and Cooperation.* Commercial communication and broadcasting space applications are still mentioned in Section III.

"*Commercial activities China actively promotes the participation of Chinese enterprises in international commercial activities in the space field. China has exported whole satellites and made in-orbit delivery of communications satellites to Nigeria, Venezuela and Pakistan; provided commercial launch services for the Palapa-D satellite of Indonesia and the W3C satellite of Eutelsat, and signed commercial satellite and ground system export contracts with Bolivia, Laos, Belarus and other countries. […]*

Key Cooperation Areas […] Commercial satellite launch service, import and export of whole satellites, satellite parts and components, import and export of ground test equipment, and building and service of satellite ground TT & C and satellite application facilities as well as related services, etc."[280]

The 2016 *White Paper* places greater emphasis on commercial space activities in a broad sense, with an expanded scope of application. In Section II, the Jilin-1 remote-sensing satellite for commercial use is mentioned. The exploration of commercial telemetry, tracking, and control system services is noted in Section III, along with broader space applications.

In Section V. *International Exchanges and Cooperation* as in previous iterations, the commercialization of satellites and launch services is mentioned.

"*China encourages and supports Chinese enterprises to participate in international commercial activities in the space field. It has exported satellites and made in-orbit delivery of Nigeria's communications satellite, Venezuela's remote-sensing satellite-1, Bolivia's communications satellite, Laos' communications satellite-1 and Belarus' communications satellite-1. In addition, it provided commercial launch service for Turkey's Gokturk-2 earth observation satellite, and when launching its own satellites took on small satellites for Ecuador,*

[280] "China's Space Activities in 2011 - Official Translation."

Argentina, Poland, Luxembourg and other countries. It has also provided business services concerning space information."[281]

In the 2022 White Paper, the term "commercial" appears a total of 26 times in the original text, 17 times in the English version. The term is therefore overrepresented compared to previous editions of the White Paper published after 2000.

The term "commercial" associated with the launch sector appears again in the sections describing achievements over the past five years and priorities for the years to come. It is mentioned in Part 2, *Development of Space Technology and Systems*, which, in the Chinese version, draws a certain distinction between the *commercialization of a Long March rocket launch service* [上商业化应用发射 *shangyehua yinyong fashe*] on the one hand, and *commercial launch vehicles* [商业运载火箭 *shangye yunzai huojian*] on the other. It lists indiscriminately Jielong-1, Kuaizhou-1, Hyperbola-1, and Ceres-1.

"*Space Transport System - […] China now provides a variety of launch vehicle services. The Long March-11 carrier rocket has achieved commercial launch from the sea; the Smart Dragon-1, Kuaizhou-1A, Hyperbola-1, CERES-1 and other commercial vehicles have been successfully launched; successful demonstration flight tests on reusable launch vehicles have been carried out.*"[282]

This arrangement is particularly interesting, though its interpretation remains largely open to speculation. On one hand, it officially acknowledges for the first time in a *White Paper* the existence of launch vehicle models developed outside the framework of state-owned enterprises, notably distinguishing the privately developed Hyperbola-1 (iSpace) and Ceres-1 (Galactic Energy) rockets. This serves as a signal recognizing the existence of private space enterprises. However, no distinction is made between these rockets and those developed and launched by spin-offs of state-owned enterprises: Jielong (CALT-China Long March Rocket) and Kuaizhou (CASIC-ExPace). This raises the question of why the models themselves are highlighted rather than the companies behind them.

In any case, the ambiguity surrounding the concept of "commercial space" criticized by Liu Yufei and Shen Nian in the first part of this dissertation is largely reflected in this arrangement.

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[281] "Full Text of White Paper on China's Space Activities in 2016 - Official Translation."
[282] "China's Space Program: A 2021 Perspective - Official Translation."

Furthermore, while the terms "commercialization" and "commercial" in this paragraph generally align with the contextual framework outlined by Liu Yufei, their usage throughout the rest of the text does not systematically adhere to this distinction.

For the first time in 2022, commercial launch infrastructure is also mentioned in Part 2 of the *White Paper,* titled *Development of Space Technology and Systems*, in a Section 2 Space Infrastructure.

"*Space launch sites - Adaptive improvements have been completed at the Jiuquan, Taiyuan and Xichang launch sites, with new launch pads installed at Jiuquan for the commercial launch of liquid fuel rockets, and the Wenchang Launch Site entering service. China has formed a launch site network covering both coastal and inland areas, high and low altitudes, and various trajectories to satisfy the launch needs of manned spaceships, space station modules, deep space probes and all kinds of satellites. In addition, its first sea launch site has begun operation. […]*

In the next five years, China will strengthen unified technical standard-setting for its space products, and on this basis will: […] Build commercial launch pads and launch sites to meet different commercial launch needs."[283]

Commercial applications are given prominence in Part 3, *Developing and Expanding the Space Application Industry*.

For the first time, the section dedicated to policy frameworks includes prescriptive provisions regarding commercial space, aimed at encouraging the development of the sector in Title *V. Modernizing Space Governance*, Section IV. *Encourage and Guide the Development of Commercial Space Commercialization.*

"*China has formulated guidelines on commercializing its space industry. It will expand the scope of government procurement of space products and services, grant relevant enterprises access and sharing rights to major scientific research facilities and equipment, and support these enterprises in joining the R&D of major engineering projects. It will establish a negative list for market access to space activities, to ensure fair competition and the orderly entry and exit of participating enterprises.*

[283] Ibid.

China will optimize the distribution of the space industry in the national industrial chain, and encourage and guide participating enterprises to engage in satellite application and the transfer and transformation of space technologies."[284]

The use of the past tense in the English translation is somewhat uncertain, as the original version in mandarin does not show a change in tense in comparison with previous *White Papers*. In any case, significant importance is placed on the formulation of guidelines to promote the sector's growth. Among the concrete mechanisms mentioned are *state procurement*, *participation in major engineering projects*, and *access to scientific research facilities and equipment*, illustrating the diversity of mechanisms for encouraging commercial space evoked in Chapter II.

The provision in the 2022 *White Paper* could potentially give greater importance to commercial space enterprises by allowing them to participate in flagship projects, representing a shift from previous texts. A significant limitation to this interpretation, however, is that the definition of a *"commercial enterprise"* is not provided in the text. Therefore, it is impossible to determine whether the provision applies to state-owned spin-offs, mixed-ownership enterprises, private enterprises, or some or all of the above.

Furthermore, the implementation of negative measures ensuring the preservation of fair competition between participants was identified. Based on interview content presented in Chapter VII, one can assume that this competition occurs primarily between state-owned enterprises and their commercial spin-offs on the one hand, and private enterprises on the other hand. If this interpretation is correct, it would suggest a recognition by public authorities of the problem of potential or actual unfair competition, moving away from the politically correct discourse of harmonious cooperation and mutual completion between the various actors in commercial space.

Once again, the only space domain explicitly mentioned for commercial use is that of satellite applications, rather than upstream sectors. The transfer of space technologies to other fields is also highlighted.

In the Section VI. dedicated to *International Cooperation*, the 2022 White Paper does not differentiate between commercial launch services and other types of cooperation Section *2.*

[284] Ibid.

Major Achievements Subsection *(5) Space technology.* Commercial launches for foreign clients are mentioned in a prospective sense section *3. Key Areas for Future Cooperation*.

"*Together with relevant partners China has developed and successfully launched the China-France Oceanography Satellite, China-Brazil Earth Resources Satellite 04A, and the Ethiopian Remote-Sensing Satellite. It has launched the Student Small Satellites (SSS) for APSCO. It is jointly developing the MisrSat-2 remote-sensing satellite.*

China completed the in-orbit delivery of the Pakistan Remote-Sensing Satellite (PRSS-1), Venezuelan Remote-Sensing Satellite (VRSS-2), Sudan Remote-Sensing Satellite (SRSS-1), and the Algerian Communications Satellite (Alcomsat-1).

China has provided satellite carrying or launching services for countries including Saudi Arabia, Pakistan, Argentina, Brazil, Canada, and Luxembourg.

China has conducted space product and technology cooperation with countries including Russia, Ukraine, Belarus, Argentina, Pakistan, and Nigeria.

China has helped developing countries boost their space science and research. It has built satellite research and development infrastructure with countries including Egypt, Pakistan and Nigeria. It has pressed ahead with the construction of the Belt and Road Initiative Space Information Corridor, and opened China's space facilities to developing countries.

[…] China will support international cooperation on commercial spaceflight, including: (a) launching services"[285]

Thus, the provisions of successive *White Papers* on commercial launch highlight the existence of two historically distinct trends. While the *White Papers* from 2006 to 2016 reflect shifts in international commercial strategies from launch services to development, manufacturing and launch of satellites, more aptly characterized as "commercialization", the 2022 White Paper formalizes the presence of *minying* commercial enterprises among launch providers and grants a more significant role to commercial space activities through a variety of mechanisms. However, the provisions remain ambiguous: beyond failing to distinguish between "commercial space" and "commercialization", no definition of either of these terms is provided, and *minying* enterprises are mentioned only through the names of the models they develop,

[285] Ibid.

citing, among others, ExPace, a subsidiary of CASIC, alongside *minying* companies, iSpace and Galactic Energy, in a similarly undifferentiated manner.

3. Diversification of Funding Channels

The evolution in the use of the term commercial associated with spaceflight in the *White Papers*, transitioning from the commercialization of launch services for Long March rockets to the emergence of commercial launch vehicle developed *inter alia* by *minying* enterprises, is connected to another recurring idea: the diversification of funding channels. This term first appears in the 2006 *White Paper* and gains prominence in the subsequent editions. In the 2022 *White Paper*, the term "funding" disappears in favor of a focus on the diversification of players.

The 2006 *White Paper* is the first to mention the establishment of a *"diverse, multi-channel space funding system"* ［多元化、多渠道的航天投资体系 *duoyuanhua, duo judao de hangtian touzi tixi*], in Title IV. *Development Policies and Measures*. In this text, the system is presented as a means to complement state funding and ensure the sustainability of space activities.

"*To guarantee input of funds for space activities. The Chinese government will increase input to the space industry, and at the same time encourage the establishment of a diverse, multi-channel space funding system, so as to guarantee the sustainable and stable development of the space industry*."[286]

The next paragraph suggests involving more actors in space-related activities, including "commercial corporations". However, the concrete modalities are not specified:

"*To encourage people of all walks of life to participate in space-related activities, including encouraging industrial enterprises, scientific research institutes, commercial corporations, institutions of higher learning and social organizations, under the guidance of national space policies, to give full play to their advantages, take an active part in space activities, and participate in international space-related exchanges and cooperation. To encourage satellite operation enterprises and application units to use Chinese satellites and satellite- application products*."[287]

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[286] "China's Space Activities in 2006 - Official Translation."
[287] Ibid.

These two excerpts touch upon what appears to be the core of commercial space in the primary texts analyzed: a diversification of capital to include "social capital" and "popular capital", as well as a diversification of enterprises to incorporate minying enterprises. However, these latter terms are not explicitly used in the provisions; instead, terms such as "diverse", "multichannel", "all walks of life" [社会各界 *shehui gejie*], and "social organization" are favored. One can only infer that they refer to the same phenomenon.

The 2011 White Paper reiterates the wording of the 2006 White Paper while adding target areas: the prioritized participation of this *multi-channel space funding system* in *applied satellite and satellite applications*, which aligns with the findings of the previous subsection, as well as in *major scientific and technological projects* and *frontier technologies and basic research*. This wording indicates that, as early as 2011, the diversification of funding sources, without specifying their exact nature, was intended to contribute to the latter activities.

"*Guaranteeing the sustainable and steady financial investment for space activities. To gradually establish a diverse, multi-channel space funding system to ensure the investment sustainable and steady, especially to provide larger amounts for important space scientific and technological projects, applied satellite and satellite applications, frontier technologies and basic researches*."

"Encouraging organizations and people in all walks of life to participate in space-related activities. To encourage scientific research institutes, enterprises, institutions of higher learning and social organizations, under the guidance of national space policies, giving full play to their advantages and taking an active part in space activities."[288]

In the 2016 *White Paper*, the provisions are more detailed. Although the use of the past tense in the English versions of the 2016 and 2022 *White Papers* gives the impression of an "accomplished" state, distinct from the projection seen in earlier White Papers, as noted above, there is no difference in tense in the Chinese version compared to the earlier *White Papers*.

"*System of diverse funding improved - The scope of government investment is being clearly specified, the way in which such investment is arranged is optimized and investment*

[288] "China's Space Activities in 2011 - Official Translation."

management is regulated, and sustainable and steady government financial support for space activities is guaranteed.

The mechanism for market access and withdrawal has been improved. A list of investment projects in the space industry has been introduced for better management in this regard. Nongovernmental capital and other social sectors are encouraged to participate in space-related activities, including scientific research and production, space infrastructure, space information products and services, and use of satellites to increase the level of commercialization of the space industry.

The government has increased its cooperation with private investors [*popular capital* in the original version]*, and the mechanism for government procurement of space products and services has been improved.*"[289]

The first paragraph suggests that a clearer perimeter has been or is intended to be established between for activities covered by government funding

Market-driven activities would have beeen regulated, notably through the use of lists. Our research has not identified such a list specific to the aerospace sector, however, it exists and is accessible for the civil aviation sector: the *First Batch of Project List for the Encouragement of People's Capital in Civil Aviation*, enacted in 2018 by the Civil Aviation Bureau and the NDRC[290].

The participation of "nongovernmental capital and other social sectors" is encouraged in scientific research and production, as well as in a number of other domains, none of which explicitly include launches. It is worth noting that the term "space infrastructure" is employed.

Private investors are explicitly mentioned as cooperating further with the government, though no specifics are provided regarding the modalities of this cooperation. Procurement is also discussed as an improvement.

As identified in the previous subsection, the 2022 White Paper gives significant prominence to the term *"commercial"* in its Section V, *Modernizing Space Governance*, within a subsection

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[289] "Full Text of White Paper on China's Space Activities in 2016 - Official Translation."
[290] "Announcement of the First List of Civil Aviation Projects Encouraging Private Investment [首批民航领域鼓励民间投资项目清单公布 Shou Pi Minhang Lingyu Guli Minjian Touzi Xiangmu Qingdan Gongbu]," accessed April 3, 2025, https://www.moj.gov.cn/pub/sfbgw/qmyfzg/fzgzzffz/201808/t20180824_152846.html.

titled *Encouraging the Development of Commercial Space.* Interestingly, however, investments are not mentioned in the 2022 White Paper; instead, the focus is directly on the market and enterprises, working in concert with a state system comprising the government and companies. The emphasis is placed more on industrial chains than on funding.

The 2022 *White Paper* section has been completely reorganized, giving the impression of a significant shift in orientation. However, the use of terminology remains vague, making it difficult to draw definitive conclusions.

"*The Chinese government has been proactive in developing the space industry, through policy measures and well-thought-out plans for space activities. Better alignment between a well-functioning market and an enabling government gives full play to the roles of both, endeavoring to create a favorable environment for the growth of a high-quality space industry.*

1. Enhancing Innovation - In order to create a new configuration in which the upper, middle and lower industrial chains are coordinated, and large, small and medium-sized enterprises advance in an integrated way, China is building a strategic force of space science and technology, encouraging original innovation by research institutes and bringing together enterprises, universities, research institutes and end-users in creating and applying new technologies. A technological innovation alliance is emerging in key areas of space science. […]

2. Strengthening Basic Industrial Capabilities - The space industry will continue to improve its integrated and open industrial system comprising system integrators, specialized contractors, market suppliers, and public service providers, and covering all links from research to production. […]

3. Expanding Application - China will improve the policies for its satellite application industry, including coordinating public interest and market demand, integrating facilities and resources, unifying data and product standards, and streamline the channel for sharing and utilization. It is committed to improving satellite application services with unified standards and customized choices.

China will move faster to grow its satellite application market, where various market entities are encouraged to develop value-added products. By creating new application models, China

is fostering a "space plus" industrial ecosystem and promoting emerging strategic industries related to space."[291]

The first paragraph emphasizes the importance of both a "well-functioning market" and an "enabling government", without clearly distinguishing between different sectors, as was the case in previous *White Papers*.

The following paragraphs do not differentiate between the various types of enterprises involved, as they are framed within broad and ambitious objectives such as enhancing innovation, strengthening basic industrial capabilities, and expanding applications.

4. Targeting Talent and Public

The last theme mentioned in the white papers that I will tackle in this Chapter IV, which resonates with elements frequently discussed in other sources, including Chinese authors analyzed in Chapter II and English-language literature presented in the introduction, is the issue of talent recruitment, more broadly associated in the *White Papers* with raising public awareness.

As early as the 2000 *White Paper*, the question of talent is mentioned under Title III: *Future Development.* This section includes two elements that are present throughout all the *White Papers*: on the one hand, the development of talent in the space sector through education and professional training to create a "contingent", and on the other, public outreach to promote the development of this industry.

"– Speeding up the development of talented people in the space industry and forming advantages in this regard. Special policies will be adopted to promote space education and train qualified personnel to foster a contingent of young and highly qualified space scientists and engineers. Efforts will be made to publicize space knowledge, and motivate all sectors of society to support the development of the space industry."[292]

In Section IV: *Development Policies and Measures* of the 2006 *White Paper*, these two notions are presented as two successive points. On the one hand, it involves encouraging the participation of a broader diversity of actors — "*organizations and people in all walks of life*"

[291] "China's Space Program: A 2021 Perspective - Official Translation."
[292] "2000 China's Space Activities - Official Translation."

— in activities related to space. It is worth noting that this first point directly follows the one on diversifying funding sources for the space sector. On the other hand, a rather elitist vision is put forward regarding talent development: the priority is to train a "*structured contingent of young and highly qualified space scientists and engineers*". Communication within the space sector is designed to serve this purpose.

"*To encourage people of all walks of life to participate in space-related activities, including encouraging industrial enterprises, scientific research institutes, commercial corporations, institutions of higher learning and social organizations, under the guidance of national space policies, to give full play to their advantages, take an active part in space activities, and participate in international space-related exchanges and cooperation. To encourage satellite operation enterprises and application units to use Chinese satellites and satellite- application products.*

To strengthen the fostering of talented people for the space industry. To spare no efforts for the education and cultivation of personnel, give attention to whetting their sense of innovation through practice. In particular, it is necessary to pay more attention to fostering a rationally structured contingent of young and highly qualified space scientists and engineers. To make efforts to publicize space knowledge and culture, and attract more outstanding personnel into the space industry."[293]

The provisions of Title IV of the 2011 *White Paper* are organized in the same way and are largely similar in terms of content.

"*Encouraging organizations and people in all walks of life to participate in space-related activities. To encourage scientific research institutes, enterprises, institutions of higher learning and social organizations, under the guidance of national space policies, giving full play to their advantages and taking an active part in space activities.*

Strengthening training of professionals for the space industry. To vigorously develop a favorable environment for the development of professional personnel, fostering leading figures in the space industry and forming a well-structured contingent of highly qualified personnel in

[293] "China's Space Activities in 2006 - Official Translation."

the course of conducting the important projects and basic researches. To publicize space knowledge and culture, and attract more outstanding personnel into the space industry."[294]

Section IV of the 2016 *White Paper* is organized slightly differently, particularly in that the subsections are titled and noticeably more detailed. In the paragraph concerning talent, the wording remains largely identical, with the notable exception of the new mention of "*experts in international cooperation*". For public outreach, concrete examples of events are highlighted, including the establishment of April 24 as "National Space Day" starting in 2016, which is also mentioned in the preamble of the text. Here, we can observe a certain evolution compared to previous *White Papers*, as the text incorporates concrete proposals.

"*Training of professionals for the space industry strengthened - The mechanisms related to the training, assessment, flow of and incentives for professional personnel are being improved in an effort to form a well-structured contingent of highly qualified personnel in the course of construction of important projects and major programs, which consists of strategic scientists, leading researchers and technicians, entrepreneurs and high-caliber professionals, as well as experts in international cooperation.*

Knowledge about space science disseminated - Events have been organized around "China Space Day", "World Space Week" and "Science and Technology Week" to disseminate knowledge and culture about space, promote the "Spirit of the Manned Space Program", inspire the nation, especially its young people, to develop an interest in science, explore the unknown and make innovations, and attract more people into China's space industry."[295]

In Title V: *Modernizing Space Governance* of the 2022 *White Paper*, efforts dedicated to personnel training and public outreach appear more ambitious compared to previous editions. For instance, Point 6: *Strengthening Team-Building* outlines the goal of becoming "*a world center for talent and innovation in space science.*"

"*Strengthening Team-Building - China will step up its efforts to become a world center for talent and innovation in space science, and create favorable conditions for the development of professionals and the expansion of their ranks. It will improve the personnel training mechanism - fostering a pool of strategic scientists, leading and young scientists, and teams with strong innovation capacity, and cultivating a large number of outstanding engineers, top*

[294] "China's Space Activities in 2011 - Official Translation."
[295] "Full Text of White Paper on China's Space Activities in 2016 - Official Translation."

technicians championing fine craftsmanship, and visionary entrepreneurs with a sense of social responsibility. China will improve its personnel management mechanisms to regulate and guide the rational flow of professionals. It will also upgrade incentives with greater rewards and stronger support, and strengthen specialty disciplines in universities to cultivate a reserve force of aerospace personnel.

Regarding the groups targeted for development, in addition to both "*leading and young*" scientists, there are engineers, high-level technicians—a recent concern of public authorities—and "*visionary entrepreneurs with a sense of social responsibility*", reflecting the shift toward the new commercial space sector. The precision that entrepreneurs fostered should be "visionary" and "with a sense of social responsibility" may be linked to the discussion on speculative risks: the text explicitly encourages the creation of innovative enterprises, rather than fostering market dynamics driven by speculative bubbles.

To concretely support these individuals, the idea of "upgrading incentives" is emphasized, which could imply higher salaries, as well as the strengthening of dedicated university programs.

Promoting Space Education and Culture - China will continue to hold events to celebrate its Space Day, promote education on space knowledge and culture during World Space Week and National Science and Technology Week, and through Tiangong Classroom and other platforms, and promote the culture and spirit embodied in the development of the atomic and hydrogen bombs, missiles, man-made satellites, manned spaceflight, lunar probes and the BeiDou Navigation Satellite System in the new era. The goal is to inspire the nation, especially the young people, to develop an interest in science, to create and explore the unknown, and to increase scientific knowledge among the general public.

China will protect its major space heritage and build more space museums and experience parks to popularize space science and provide education. It will encourage the creation of space-related literary and art works to promote space culture."[296]

In the section devoted to public outreach, the public events mentioned in 2016 are reiterated. The construction of museums, theme parks, literary works, and artworks is also highlighted, all

[296] "China's Space Program: A 2021 Perspective - Official Translation."

with the ongoing objective of inspiring vocations. This concern was also commented on during field interviews as evoked Chapter VII.

In the next sections of this Chapter IV, we examine the provisions of texts deemed particularly relevant to Chinese commercial space activities in the launcher sector: the *Interim Measures on the Administration of Permits for Civil Space Launch Projects*[297], released in 2002 by the Commission for Science, Technology and Industry for National Defense, the *Guiding Opinions on Innovative Investment and Finance mechanisms to encourage social investment in Important Areas* enacted by the State council in 2014[298], third the *Notice on Encouraging the Development of Market Launch Carrier Rockets in an Orderly Way* published in 2019 by the Beijing office of the State Administration for Science, Technology and Industry for National Defense (SASTIND) and Central Military Commission (CMC) equipment department[299]. For each text, a synthesis is provided followed by an analysis of its content.

These texts were selected for their particular relevance to commercial launch sector, addressing both the historical "commercialization" and contemporary "commercial" components. The *2002 Interim Measures* and the *2019 Notice* specifically address launch services and illustrate the findings of the first part of the dissertation. Both these texts are regulations specific to the space launch sector. The *2014 Guiding Opinions* are frequently cited as the starting point for contemporary commercial space in China but has not been subjected to detailed analysis in the existing literature. In reality, it represents a broader economic strategy, with one section applied to space, and a rather ambiguous mention of the launch sector.

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[297] Commission for Science, Technology and Industry for National Defense, "Interim Measures for the Administration of Licenses for Civil Space Launch Projects [《民用航天发射项目许可证管理暂行办法》 Min Yong Hangtian Fashe Xiangmu Xuke Zheng Guanli Zanxing Banfa]" (2002), https://www.gov.cn/zhengce/2022-08/23/content_5722673.htm.

[298] State Council, Guiding Opinions of the State Council on Investment and Financing Mechanisms for Innovation in Key Areas to Encourage Social Investment [国务院关于创新重点领域投融资机制鼓励社会投资的指导意见 guowuyuan guanyu chuangxin zhongdian lingyu tou rong zi jizhi guli shehui touzi de zhidao yijian].

[299] Notice by the State Administration of Science, Technology and Industry for National Defense and the Equipment Development Department of the Central Military Commission on Promoting the Standardized and Orderly Development of Commercial Launch Vehicles [国家国防科技工业局 中央军委装备发展部关于促进商业运载火箭规范有序发展的通知 guojia guofang keji gongye ju zhongyang junwei zhuangbei fazhan bu guanyu cujin shangye yunzai huojian guifan youxu fazhan de tongzhi].

B. Interim Measures on the Administration of Permits for Civil Space Launch Projects

1. Synthesis

In 2002, the COSTIND, released the *Interim Measures on the Administration of Permits for civil Launch Projects* (hereinafter 2002 *Interim Measures*).

2002 interim measures provide for a basic framework for *civil space launch projects* [民用航天发射项目 *minyong hangtian fashe xiangmu*] through the establishment of a permit system managed by COSTIND.

A definition of a civil launch project is given article 2. This definition is twofold and includes both launches from Chinese territory, notwithstanding of the origin of the satellite or probe, and launches of Chinese satellites or probe from abroad : "*A civil space launch project under the scope of these measures refers to, for non-military purposes: the act of entering outer space by a spacecraft such as satellites from within Chinese territory, as well as the act of entering outer space by a spacecraft such as a satellite for which natural persons, legal persons, or other organizations of the People's Republic of China have property rights from outside Chinese territory.*"[300]

The general contractor for a satellite launch project files a submission to the COSTIND. The project must comply with national laws, ensure *inter alia* national security and interest, public safety (art. 6). The application takes place 9 months before the scheduled launch. The file includes a permit application form, technical information relative to the launch, a safety report and other materials proving legal compliance (art. 7). The COSTIND examines the application within 30 days. If the application is successful, a permit is delivered, containing administrative information of the licensee, the launch, as well as the validity period and information on issuing authority and the issuing time (art. 9). In case of a launch from a Chinese launch site, the permit holder files another application to the COSTIND containing documents relative to the carrier rocket (art. 20).

[300] Commission for Science, Technology and Industry for National Defense, Interim Measures for the Administration of Licenses for Civil Space Launch Projects [《民用航天发射项目许可证管理暂行办法》 min yong hangtian fashe xiangmu xuke zheng guanli zanxing banfa].

2. *A Basic Framework for Civil Launch Projects*

The 2002 *Interim Measures* are short, containing only 27 articles. In particular, the regime for responsibilities Section V is limited. It provides for administrative and criminal sanctions in the event of false declaration or launch without a permit for project leaders, negligence or abuse of power for the review authority.

Several regulatory instruments are present in 2002 *Interim Measures*, making it the prime framework for commercial launches in China: a definition of the scope of the activities, namely civilian launches; an authorization system for which a unit in charge, COSTIND, is designated; elements of a liability regime. However basic, they still formalized and clarified a framework for the diversification of players in the industry. The 2002 Interim Measures did not intend to regulate the activities of non-state rocket manufacturing enterprise that were not envisioned at the time, but to commercialize existing national launchers to foreign clients. Still in force today, 2002 *Interim Measures* constitute an important element for the application procedure to commercial carrier launch set up by 2019 *Notice*.

3. *Formalizing a Diversification of Players in the Space Launch Industry*

The publication of the 2022 *Interim Measures* is a part of the context of the time marked by the desire of Chinese public authorities to encourage the use of space for civil applications for the development of the country on the one hand, the entrance in the World Trade Organization (WTO) encouraging more transparency and clarity in the legal framework on the other hand.

*Interim Measure*s are a type of document that is usually enacted in order to address rapidly a pressing issue. The nature of the text as can also be explained as it being a formalization of a pre-existing procedure. It has been hinted that, prior to the 2000s, there was no need for a written framework of authorizations and supervision in Chinese space sector, as the military and government organs were functioning behind closed doors[301]. It is the opening of China to the international community with the launch of foreign-made satellites and the diversification of space actors, including universities, that has made it necessary to draft the first regulatory texts.

The *Interim Measures* of 2002 act the decision to put the Long March launchers on the international market. It has been argued that this decision and subsequent creation of the China

[301] Xiaodan Wu, 'China's Space Law: Rushing to the Finish Line of Its Marathon', *Space Policy* 46 (1 November 2018): 38–45, https://doi.org/10.1016/j.spacepol.2018.03.004. p.39Yuan and Peeters, "Research Viewpoint."p.

Great Wall Industry Corportation (CGWIC) to this end was a decision of the ministry in charge of space industry in order to cope with decrease in budget[302]. Generally speaking, various defense ministries followed independent, sometimes contradictory initiatives at the time to tackle the same issue[303].

Another important reason for enactment of a regulatory framework was increased international pressure, notably from the United States. Greater transparency and alignment with certain international standards were also part of China's wider insertion in the international arena, notably WTO admission procedure that ended in 2001.

The 2014 *Interim Measures* did not intend to regulate the activities of *minying* rocket manufacturing enterprise that were not envisioned at the time, but to facilitate commercialization of existing national launchers to foreign clients while aligning with international law obligations. They are still in force today, and constitute an important element for the application procedure to commercial carrier launch set up by the 2019 *Notice*.

[302] Y. 194Chen, « China's Space Commercialization Effort: Organization, Policy and Strategies », Space Policy 9, no 1 (1 February 1993): 45-53, https://doi.org/10.1016/0265-9646(93)90008-W. p.48

[303] Anne Gilks, 'China's Space Policy: Review and Prospects', *Space Policy* 13, no. 3 (1 August 1997): 215–27, https://doi.org/10.1016/S0265-9646(97)00018-0. p.223

C. Encouraging Social Capital in Investment and Financing Mechanisms in Key Innovation Areas

1. Synthesis

In 2014, the State Council published the *Guiding Opinions on Innovative Investment and Finance mechanisms to encourage social investment in Important Areas*.

The 2014 *Guiding Opinions* are widely considered to be a pivotal moment in the emergence of new commercial space activities in China, often presented as the starting point for the creation of new private launcher companies[304]. Yet, the scope of the text goes far beyond space and launchers are not even directly mentioned. Although it has sometimes been dubbed as the 'Document 60', its regulatory nature is clearly identified as Guiding Opinions [指导意见 *zhidao yijian*].

The fact that 2014 *Guiding Opinions* are a high-level broad-ranging policy document gives an indication of the reframing of commercial space by the public authorities in the PRC: as part of the larger restructuring of industries traditionally dominated by state capital and not just as a technical area restricted to a specialized unit. It makes clear that the space sector is called upon to reform for the purpose of a broader economic strategy. It initiates the opening of crucial sectors that had been dominated by central government capital, urging them to adopt a more efficient management through non-state investment and entrepreneurship.

2. The Restructuring of State-Driven Industries

In fact, the 2014 *Guiding Opinions* focus on the restructuring of state-driven industries. It identifies eight sectors, defined as priority sectors [重点领域 *zhongdian lingyu*]: ecology and environment (chap. 2); agricultural and hydraulic engineering (chap. 3) ; municipal infrastructure (chap. 4) ; transportation (chap. 5) ; energy facilities (chap. 6) ; information and civil space infrastructure (chap. 7) ; social undertakings (chap. 8). In those sectors, diversification of investors and operators is encouraged.

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[304] See for example: Liu et al., "Evaluation of China's Commercial Space Sector."p.14, Walsh, Christensen, and Ronci, "Lost Without Translation - Identifying Gaps in U.S. Perceptions of the Chinese Commercial Space Sector." p.8, Pollpeter et al., "China's Space Narrative - Examining the Portrayal of the Us-China Space Relationship in Chinese Sources and Its Implications for the United States."pp.32-35

The text sets up a number of common mechanisms for the eight areas mentioned. The main mechanism, which concerns all the sectors mentioned, is the entry of so-called "social" capital, reflected in the title of the text, to invest in these key areas. The most common formula, reflected in the title, is *"attract" "promote"* or *"encourage social capital to participate in the construction of ...*", which appears 15 times in the body of the text. For example: attract social capital to participate in urban rail transit construction (art. 15); encourage social capital to participate in the construction of education, medical care, elderly care, sports and fitness, and cultural facilities. (art. 26)

The expression "*diversification from the main body*" [主体多元化 *zhuti duoyuan hua*] is noted as in the White Papers, for example: "*promote the diversification from the main body in ecological construction subjects*" (art. 4) "*promote the diversification of investment subjects in information and civil space infrastructure*" (chap. 7). The term "marketization "[市场化 *shichang hu*] also appears. For example, "*promote the marketization of environmental pollution control*" (art. 5).

2014 *Guiding Opinions* focus on the restructuring of industries traditionally dominated by state capital. In the title of the text and main means for this diversification, greater participation of "social capital" which is pivotal to the analysis of this Part 2 of the dissertation.

If the term "capital" is used, the diversification of actors is not limited to investment [投资 *touzi*] but is also accompanied by a diversification of operators [运营 *yunying*] which can be seen in the titles of the sub-parts, for example: "*encourage social capital investment and operation of agricultural and water conservancy projects*" (Chap. 3); "*promote the marketization of municipal infrastructure investment and operation*" (Chap. 4). The distinction between investors and operators is not clearly established in the text. On the other hand, in the diversification of stakeholders, *minying* enterprise are set on an equal footing with local authorities, such as railways exploitation (art. 15), or local SOEs, for example in oil and gas pipeline networks (art. 20). "*Publicly built, privately operated*" [公建民营 *gongjian minying*] is evoked for social undertakings (art. 26).

The 2014 *Guiding Opinions* implements a number of other mechanisms for government encouragement of new "social" investors and actors in the designated areas, including:

- Subsidies and tax exemptions, particularly associated with local governments (art. 7, 12, 17, 27)
- State procurement systems from private companies under development (art. 5, 12, 26), equal treatment with SOes (art. 8)
- Enhancement of the price formation mechanism (art. 10, 14, 21), guaranteed return on investment mechanism (art. 8,10,14)
- Sectoral reforms of the regulatory, legal or administrative framework (art. 3, 15, 16, 17, 19, 21, 22, 24, 25, 27, 29)
- Implementation of pilot projects (art. 6, 10, 13, 22), and designated projects (art. 15, 19), exploration of new financial policies and methods (art. 6, 9, 17, 35, 36)

These mechanisms could be useful for classifying the various policies, particularly at the local level, implemented to encourage the development of commercial space. They also sharply highlight the fundamentally cross-industry and cross-sectoral nature of the policy tools used. This could help better integrate the case of commercial space into a broader study of China's development and innovation model, by drawing parallels with other sectors.

3. *Promote the Diversification of Investment Entities in Information and Civil Space Infrastructure*

Chapter 7 of the 2014 *Guiding Opinions*, articles 22 to 24 are dedicated to "*Promoting the diversification of investment entities in information and civil space infrastructure*". Article 24 is dedicated to space:

"*Encourage people's capital to participate in the construction of national civil space infrastructure. Improve the civilian remote sensing satellite data policy. Strengthen government procurement services. Encourage people's capital to develop, launch and operate commercial remote sensing satellites. Provide professional and market-oriented services. Guide people's capital to participate in the construction of satellite navigation ground application systems*."

As can be seen, the text encourages the entry of private capital in the space sector, national civil space infrastructure. Policy means are given: policy and regulatory framework improvement, strengthening of government procurement, providing guidance and professional services. Sectors are highlighted: remote sensing satellites and satellite navigation ground application systems.

It is interesting to note that launchers are not explicitly encouraged: the turn of phrase where they are mentioned emphasizes remote sensing satellites rather than launchers. Moreover, "*national civilian space infrastructure*" likely refers to a definite set of activities, including remote sensing; telecommunication and navigation satellites manufacturing, operation and the exploitation of data, as it is the definition given in the 2015-2025 *Medium- and Long-term Development Plan for National Civil Space Infrastructure* discussed in the previous subsections, and does not explicitely include launch[305].

Chapter 9 of the 2014 *Guiding Opinions* focuses on a more pronounced development of the public-private partnership model, the operation of which needs to be clarified and standardized by means of special procedures. Chapter 10 emphasizes better rationalization of government investment aimed at efficiency. Chapter 11 encourages innovation in means of financing, such as exploring credit services, equity and debt financing, and encourages the development of policy oriented financial institutions and investment funds dedicated to the construction of key areas.

The annex to the text details a planning according to which 10 of specific implementation texts will be enacted specialized ministries and public organs on the basis of the 2014 *Guiding Opinions*.

The 2014 *Guiding Opinions* enshrines the space sector in a larger economic strategy aiming at the diversification of investors, operators and finance mechanisms in priority area. Hence, the main focus of it is not space, which is only quoted 7th and a part of a whole for which greater participation of "social capital".

This text can therefore be seen as an instrument to operate, if not privatization, at least a greater diversification in the financing and operation among different "priority field". The diversification in the space sector is carried out under highly mixed modalities, with government acting as a "guide" to social capital; enacting sectoral policies and providing procurement contracts. Today, a privileged instrument of state sector reform is "guided funds". Financed by public funds at the national or local level, these operate with a profit motive whilst

[305] National Development and Reform Comission, Medium- and Long-Term Development Plan for National Civil Space Infrastructure (2015–2025) [《国家民用空间基础设施中长期发展规划（2015-2025）》 guojia minyong kongjian jichu sheshi zhong chang qi fazhan guihua (2015–2025)].

at the same time following political priorities[306]. Other provisions give pride of place to public-private partnerships and the like.

In terms of designating units in charge, it is interesting to note that, for many of the mechanisms exposed to encourage the entrance of "social capital", the relevant implementation unit is located at the local level. This is the case for subsidies and tax measures, for which provinces are autonomous. Hence, local governments have an important leeway in the way they encourage the development of these activities.

[306] See for example : H. Chen, M. Rithmire, "The Rise of the Investor State: State Capital in the Chinese Economy", Cambridge (Masachussets), *Harvard Graduate School of Business Administration working papers*, Vol. 20 n°120, May 2020

D. Encourage the Development of Market Launch Carrier Rockets in an Orderly Way

1. Synthesis

In October 2019, the Beijing office of the SASTIND along with the Central Military Commission Equipment Department published a *Notice on encouraging the development of market launch carrier rockets in an orderly way.*

The organization of the 2019 *Notice* is similar to 2002 *Interim Measures*, yet couched in more precise terms. In terms of regulatory instruments, the definition is clearer and more exhaustive; the regime of the authorization has been elaborated; the units in charge are clearly designated with the addition of local units of SASTIND and provincial governments.

The text opens with a definition of commercial launcher companies article 2 as: "*Referring mainly to launch vehicles, related research, production and space launches, that are conducted by various enterprises through their own funds, social capital, joint ventures and other modes, having profit as its main purpose, under the premise of meeting national security and public interests, and in accordance with national security regulatory requirements and market operation mechanisms."*[307]

With respect to the 2002 Interim Measures, the definition and the field of activities have been modified -from civil launches to commercial launches-, but also largely elaborated. Thus, the type of companies to which the text is addressed is clarified: those which operate from own- or social capital. The text frames the activity of these companies all along the production chain. Scientific research and production activities of commercial launch vehicles covered by 2019 *Notice* include in article 3 research and development, production, test and launch for "*disposable launch vehicles (including sounding rockets with launch heights of 30 to 200 kilometers), reusable launch vehicles, reentry and return vehicles and other system-level or sub-systems*".

It is particularly noteworthy that, in this context, the definition of a commercial enterprise is based on the capital ownership structure, referencing equity capital, social capital, joint ventures,

[307] Notice by the State Administration of Science, Technology and Industry for National Defense and the Equipment Development Department of the Central Military Commission on Promoting the Standardized and Orderly Development of Commercial Launch Vehicles [国家国防科技工业局 中央军委装备发展部关于促进商业运载火箭规范有序发展的通知 guojia guofang keji gongye ju zhongyang junwei zhuangbei fazhan bu guanyu cujin shangye yunzai huojian guifan youxu fazhan de tongzhi].

and other forms of investment. As will be examined in Part 5 of this dissertation, which focuses on the quantitative analysis of corporate ownership structures, these factors are crucial in distinguishing *minying* enterprises from other mixed-ownership enterprises.

The authorization system is more detailed and sophisticated in regard to 2002 *Interim Measures*. The text sets out the procedures in two distinct authorization systems: permits for scientific research and production of weapons and equipment for one, authorization for space launches for two. The first system is placed under the aegis of SASTIND which issues two types of authorization for items on the weapons and equipment catalog: permits for research; permits for production. National SASTIND and CMC equipment department must be notified prior to the development and production of launcher-related products (art. 5). The second system includes the provisions of 2001 text, dividing responsibility between local representations of the SASTIND, the central level of the administration and CMC (art. 7)

More consistent provisions for launch sites are provided (art. 10), which are the prerogative of the State alone, at the difference of test sites which may be operated by companies (art 11). The liability regime is somewhat extended in regard to 2002 interim measures, relying on the same principle of primary responsibility [主体责任 *zhuti zeren*］for companies, while supervision and inspection responsibility [监督检查责任 *jiancha zeren*］rests to the provincial-level administrative departments of SASTIND (art. 13). Absent in the 2002 text, local authorities become important links in the decision-making process to authorize "private" activities.

In the last articles of the notice, numerous mentions of other regulations and procedures is made, be it regarding safety ("*Regulations on the Safety Management of Hazardous Chemicals*" ; "*Regulations on the Safety Management of Civil Explosives*"; "*Interim Measures for the Safety Management of Military Hazardous Chemicals*" mentioned art.14), export control and technology transfer (art. 15 and 16).

A strong cooperation with public owned industry, notably the military, is encouraged. Reference is made to several texts regarding sharing of military infrastructure[308] A coordination

[308] ("Opinions of the State Council on the Opening of Major National Scientific Research Infrastructures and Large-scale Scientific Research Instruments to the Society"; "Opinions of the State Council general on Promoting the Deep Development of Military-civilian Integration of National Defense Science and Technology Industry", and Ministry of Finance of the National Defense Science and Industry Provisions such as the "Notice on Promoting the Opening of Major Military Test Facilities and Large-scale Scientific Research Instruments to the Society" (art. 17)

mechanism [协同机制 *xietong jizhi*] will be set up by relevant State units to promote and support the innovation and development of commercial launch vehicles (art 18).

A "*List of supporting laws and regulations related to my country's space activities" comes as an attachement to the text*."

2. A Clear Administrative Framework for Commercial Launch Companies

The 2019 *Notice* provides a clear administrative framework for commercial launch manufacturing companies. It should be noted that, unlike the 2001 text, it is specifically aimed at commercial activities, on the one hand, and launch activities, on the other hand, for which a comprehensive definition is given in the preliminary provisions.

At the difference of 2002 text that was enshrined in more global and less defined objectives, 2019 notice is inserted in a set of clearly identified national objectives that can be spotted in the first lines: national innovation-driven development strategy, military-civilian integration development strategy.

Globally speaking, the 2016 *Guiding Opinions* are marked by a stronger insertion of the provisions related to commercial launchers in a broader national regulatory and legal corpus. Also, the annex makes reference to many other texts of various nature, including corporate law (*Regulations on the Registration and Administration of Enterprise Business Scope*) and international treaties (*International Space Regulations; Convention on Liability*) reinforcing this impression.

3. Clarification, Structuring and Stronger Integration With Other Policies

The change in space policies comes following the emergence of new enterprises in the field, in particular new commercial space launch enterprises. Between 2014 and 2019, a number of launcher companies were created such as Space Transportation, LinkSpace, Space Trek, Land Space, OneSpace, ISpace, Deep Blue Aerospace, JZYJ, Galactic Energy and Ex Pace[309]. One can see how these illustrate the definition of commercial launch enterprises given in the opening

[309] Research on Space Industry in China 2019 [2019 中国商业航天产业研究报告 2019 zhongguo shangye hangtian chanye yanjiubaogao], Iyiou intelligence November 2019 ; I. Liu and al ., Evaluation of China's Commercial Space Sector; Jean Deville, Thoughts on the "Hype" about China's NewSpace Launcher Startups – (Part 1/2), The China Aerospace Blog, September 12th 2019, https://china-aerospace.blog/2019/09/12/thoughts-on-the-hype-about-chinas-newspace-launcher-startups-part-1/.

of 2019 *Notice* and 2014 *Guiding Opinions*: enterprises can be financed at least in part by equity or "social capital" that differ from the central state.

As noted above however, the development of commercial and private launcher enterprises was not the main objective of 2014 *Guiding Opinions*. Between 2014 and 2019, some were nevertheless created, operating in the inadequate existing framework. LandSpace and OneSpace made unsuccessful launches before the publication of 2019 *Notice*, respectively on October 27th 2018, and 27th march 2019. One can also hint that the presence of the terms "standardized and orderly" [规范有序 *guifan youxu*] in the title contains an implicit critique of the disorganized manner in which the sector had been perceived to be developing so far.

The 2019 *Notice* shows a desire on the part of the authorities to clarify the framework for commercial launch activities, likely to foster the development of a commercial launcher sector. The latter does mention the enactment of sectoral policies as means to encourage the entrance of non-central state investors and operators. The text makes numerous references to other texts, arguably in order to clarify existing rules for new entrants. Some of the criticisms that had been made of the previous framework in the face of diversification of space actors and activities are addressed. For example, the text specifically covers the whole course of civil space activities from development and test to production and launch.

The place given to local SASTIND bodies in the 2019 directive is interesting. Absent in the 2002 text and not raised in the specialized and academic litterature studied in Chapter II, local authorities become important links in the decision-making process to authorize "private" activities.

However, some consider the 2019 *Notice* to be a case of SASTIND taking over a spontaneous activity, as it frames commercial launches in a stricter, even stifling, way. As Nie Mingyan underlines, under dispositions of the 2019 *Notice*, the agreement of a provincial government became a *sine qua non* condition for establishment of private launchers enterprise [310], although it is somewhat doubtful that a launcher enterprise could have been established in a given Province without knowledge and agreement of local authorities prior to the enactment of this text.

[310] Mingyan Nie, 'Space Privatization in China's National Strategy of Military-Civilian Integration: An Appraisal of Critical Legal Challenges', *Space Policy* 52 (1 May 2020): 101372, https://doi.org/10.1016/j.spacepol.2020.101372.

Chapter Conclusion

This chapter examined the evolution of China's policy framework for commercial space launch activities through a selection of key regulatory and policy texts.

The analysis of the White Papers on China's space activities reveals the evolving discursive positioning of commercial space within national priorities. While early editions, particularly in 2000, emphasized the commercialization of launch services for foreign clients via the Long March rockets, later texts progressively shifted focus toward domestic downstream applications, then the upstream sector. Notably, the 2022 White Paper marked a turning point, not only by explicitly naming private and mixed-ownership launchers but also by dedicating a subsection to "commercial space"—a first in two decades of publications. However, despite this increased visibility, the documents remain vague in terminology, failing to clearly define "commercial" or distinguish between different types of enterprises. As such, the White Papers reflect both a growing state interest in integrating private actors into strategic sectors and possibly illustrate the instrumental character of the vagueness in formulation allowing elasticity in governance as we hypothesized in the previous chapter.

The second part of the chapter examines three policy texts that frame the regulatory evolution of commercial launch activities in China: the 2002 Interim Measures, the 2014 *Guiding Opinions*, and the 2019 Notice. Together, these documents trace a shift from a narrow focus on international commercialization of state launchers to a more ambitious effort to structure and channel the emergence of new private and mixed-ownership actors. While the 2002 *Interim Measures* introduced a basic permit regime largely aimed at foreign clients, the 2014 *Guiding Opinions* marked a significant departure, embedding the space sector into a broader economic strategy centered on the diversification of capital and operators across key national industries. The 2019 Notice responded directly to the proliferation of new launch enterprises by establishing a more comprehensive—and arguably more restrictive—regulatory framework.

By tracing this evolution, the chapter highlights how policy support for new actors in the launch sector did not stem from a coherent master plan, but rather emerged through a mix of exploratory initiatives and retrospective adaptations to developments already underway.

Part 3 – Assessment of the Commercial Launch Market by Enterprise Type

Part 3 provides a market assessment of the commercial launch sector in China from an analytical perspective. Drawing from publicly available data, it examines both supply and demand dynamics, with a focus on a selection of 13 main commercial launch enterprises. By doing so, it establishes a comparative framework for understanding technological maturity, market positioning, of various enterprise typologies across the sector, organized according to the typology presented in Introduction.

This presentation helps refine the typologies of enterprises on commercial space in China by applying them to the specific segment of launch service providers. It will serve as a foundation for the following sections, which aim to further characterize these types beyond their mere identification: detailed financial structure in Part 4; corporate discourse in Part 5.

V. Chapter V – Assessment of Commercial Launch Market in China by Enterprise Type

Main findings

This chapter summarizes the state of the commercial launch market in China as of May 2024, based on a selection of 13 enterprises. An introductory section familiarizes the reader with the key issues of the market and the commercial launch companies that constitute this landscape in the PRC (Chapter V.A.).

For the selected enterprises, the launch vehicle models they develop are presented in a synthetic table based on information available on their official websites. This data allows for an analysis of the current state of supply, highlighting the concentration of operational models in the light and ultra-light solid launcher segment. A few companies stand out with distinctive technological strategies: a higher payload capacity for a solid launcher (OrienSpace) and the choice of liquid propulsion (Space Pioneer, Landspace). In contrast, state-owned spin-offs ExPace and China Long March Rocket do not appear to be positioning themselves in the liquid-fueled or higher-payload segment, reflecting a different business model that does not necessarily include new product research and development or financial pressure to compete with other enterprises. CAS Space, however, has planned to enter these market segments, with a strategy more aligned with *minying* enterprises. (Chapter V.B.)

An analysis of the launches conducted by all the selected companies provides insights into market demand. Based on satellites whose function could be identified, three major categories emerge. Earth observation represents the highest demand, accounting for more than half of the identified satellites and satellite clusters. The primary clients in this category are CGSTL, as well as Minospace and Xiyong. Nearly all commercial launch companies operate in this segment. Technology demonstration and scientific satellites make up just over one-third of the identified satellites, coming from a variety of clients, including universities and the launch companies themselves. Telecommunication satellites, particularly those for IoT constellations, represent just under 20% of the demand, with key clients including Guodian Gaoke, HEAD Aerospace, and Xingyun. No systematic pattern is observed between the nature of the client and the type of launch provider they choose. This suggests that the choice of which type of enterprise to contract for launch services is actively made by satellite manufacturers and operators (Chapter V.C.).

The final subsection of this chapter focuses on two major segments of demand: access to public contracts and the international commercial launch market. On the one hand, while the state has encouraged the diversification of space investments, *minying* enterprises remain largely excluded from institutional procurement programs, with launches still dominated by state-owned enterprises, limiting their access to government contracts. On the other hand, despite the ambitions of private companies to expand into the international market, obstacles such as export controls, diplomatic considerations, and the dominance of state-owned enterprises in foreign space cooperation restrict their opportunities.

A. A Selection of Commercial Space Launch Companies

1. Selection Method

As of May 2024, commercial launch sector in China counts around 20 companies at various level of advancement. Below is the list of 13 enterprises, that were included in the case study, for which detailed information has been collected from variety of sources: online financial repositories, official website, WeChat official account follow-up.

English designation	**Chinese full registration name**	**Creation**
LinkSpace	北京翎客航天科技有限公司 beijing lingke hangtian keji youxian gongsi	jan-2014
Landspace	蓝箭航天空间科技股份有限公司[311] lanjian hangtian kongjian keji gufen youxian gongsi	jun-2015
SpaceTrek	北京星途探索科技有限公司 beijing xingtu tansuo keji youxian gongsi	jun-2015
OneSpace	重庆零壹空间科技集团有限公司 chongqing lingyi kongjian keji jituan youxian gongsi	aug-2015
ExPace	航天科工火箭技术有限公司 hangtian kegong huojian jishu youxian gongsi	feb-2016
China Long March Rocket	中国长征火箭有限公司 zhongguo changzheng huojian youxian gongsi	oct-2016
iSpace	北京星际荣耀空间科技股份有限公司 beijing xingji rongyao kongjian keji gufen youxian gongsi	oct-2016
Deep Blue Aerospace	江苏深蓝航天有限公司 jiangsu shenlan hangtian youxian gongsi	nov-2016

[311] Concerning the nature of enterprises: all the enterprises in this sample are registered as companies with limited liability [有限公司 *youxian gongsi*], to the exception of three that are are joint stock limited companies [股份有限公司 *gufen youxian gongsi*]: Landspace, iSpace and Galactic Energy. These types of company are detailed in the *Company Law of the People's Republic of China* [中华人民共和国公司法 *zhonghua renmin gongheguo gongsifa*]. The influence of the company's legal corporate nature has not been thouroughly studied. For the sake of readability and to avoid confusion, we designate them by their English name, as presented in the table.

Galactic Energy	北京星河动力航天科技股份有限公司 beijing xinghe dongli hangtian keji gufen youxian gongsi	feb-2018
CAS Space	广州中科宇航探索技术有限公司 guangzhou zhongke yuhang tansuo jishu youxian gongsi	dec-2018
Space Pioneer	江苏天兵航天科技有限公司 jiangsu tianbing hangtian keji youxian gongsi	apr-2019
OrienSpace	东方空间（山东）科技有限公司 dongfang kongjian (shandong) keji youxian gongsi	jun-2020
RocketPi	火箭派（太仓）航天科技有限公司 huojian pai (taicang) hangtian keji youxian gongsi	jun-2020

A first list was established in 2019, based on crossed reference of existing literature on commercial space launch sector in China, in both mandarin and English[312]. Preliminary analytic results on this selection were the topic of an article published in 2021[313], including LinkSpace; Landspace; Space Trek; OneSpace; ExPace; iSpace; Deep Blue Aerospace; Galactic Energy as well as Space Transportation［北京凌空天行科技有限责任公司 *beijing lingkong tianxing keji youxian zeren gongsi*］and JZYJ［九州云箭空间科技有限公司 *jiuzhou yunjian kongjian keji youxian gongsi*］.

A second data gathering was performed after the first field research in the PRC in May 2023. The latter two enterprises, Space Transportation and JZYJ, were taken off the list then, as it was noticed that they were specializing respectively a space plane and rocket motors. Four more enterprises that had performed a successful orbital launch were added: CAS Space; Space Pioneer; OrienSpace. RocketPi was present at 2022 China Space Conference, and was hence added to the list.

It was only after finalizing research on a range of sources—WeChat communications and field interviews—that China Long March Rocket was added to the list of commercial launch

[312] Zhang Geng et al., '2019 中国商业航天产业研究报告 Research on Space Industry in China 2019' (Yiou intelligence, November 2019); Irina Liu et al., 'Evaluation of China's Commercial Space Sector' (Institute for Defense Analyses Science & Technology Policy Institute, September 2019), https://www.ida.org/-/media/feature/publications/e/ev/evaluation-of-chinas-commercial-space-sector/d-10873.ashx. ; Jean Deville, , *The China Aerospace Blog*, 12 September 2019.

[313] Lucie Sénéchal-Perrouault, 'A Chinese New Space? Commercial Launch Enterprises Within National Economic Reform', *Entreprises et Histoire*, no. 102 (April 2021): 1–23.

enterprises studied. Indeed, this company does not appear in any of the lists compiled by Chinese sources, nor in several lists presented by English-language authors[314]. Contrary to ExPace, it was never nominally designated in field interviews as a commercial space enterprise. This might have been influenced by my own perceiption on the matter, as I did ask about ExPace and not about CLMR, yet, it was never raised in a spontaneous fashion. Also, the presentation of FutureSpace Technology Research Institute at the 2023 *Commercial Space Industry and Investment Forum* of the CSC did not mention it in its list of commercial space launch enterprises, contrary to ExPace[315]. As a result, I analyze this company in Part 5, which focuses on the capital structure of enterprises, but not in Part 6, which examines their social media communication.

The enterprises presented above are not a comprehensive enumeration of all commercial space launcher manufacturing and service enterprises, but rather a selection of enterprises that demonstrated either advanced capacities in terms of test, had achieved sub-orbital or orbital launch, and/or made substantive publicity efforts as of 2023.

Indeed, in-depth data gathering for all existing enterprises was neither feasible nor desirable: given that space launchers manufacturing presents significant technological and regulatory barriers to entry, as well as a constantly shifting number of competitors, the relevance for such data over time is questionable. Blaine Curcio coins the shifting situation of the current commercial launch sector in an article dedicated to Space Pioneer in SpaceRef:

"[…] The Chinese space sector is so fast-moving that even very young companies can achieve a measure of success, sometimes before their more well-established counterparts. Moving forward, this may change to some extent, as commercialization spreads, revenues grow, and launch cadences increase. As we move towards such a dynamic, there will likely emerge a handful of winners from the pack of some 20-odd Chinese commercial launch companies, and it will become more difficult for upstarts to rapidly catch up. But until then, there seems ample

[314] The IDA *Report* did mention the enterprise in its list p.47 but wrongfully place its date of creation in 1998 (whereas China Long March Rocket only took its current name and scope of activities in 2016), which led us to believe it belonged to the same type of enterprise as CGWIC, hence an example of "space commercialization", not commercial space.

[315] Min Niu, "2023 China Commercial Space Industry Investment Report [2023 中国商业航天产业投资报告 2023 Zhongguo Shangye Hangtian Chanye Touzi Baogao]" (China Space Conference 2024, Wuhan, April 23, 2024).

room for more newcomers to the sector, even if those newcomers are not necessarily pioneers."[316]

The IDA report evokes difficulties in establishing a list of enterprises. They describe their selection method as follows:

"*Our primary method of identifying new companies was through online searches. If a company does not have a web presence or has not attracted attention from the media, we were unlikely to capture it in our survey. Consequently, years that are more recent probably undercount the number of commercial space companies that were founded. Despite this gap, companies that have a web or media presence are more likely to be active companies with funding and customers, meaning that our numbers may actually reflect legitimate companies, rather than companies that only exist on paper.*" [317]

While one of the enterprises they initially included in their research ceased to exist during the time of their study, several private launch companies that were on their list showed little activity between 2019 and 2024, and were not present in Future Aerospace Space Technology Research Institute list presented below: Dragon Drive, Seres Space Exploration [318]. Some were categorized as launch manufacturers that are motor providers: JZYJ and S Motors. Even enterprises that were considered leader or promising have seen their activity reduced since, like OneSpace and LinkSpace.

FutureSpace presentation at the 2023 *Commercial Space Industry and Investment Forum* of the CSC counted 18 such enterprises in total[319], including Space Transportation mentioned above, established in 2018; Enterspace [进取空间 *jinqu kongjian*](2018); Space Epoch [箭元科技 *jian yuan ke ji*] (2019); Haisheng Dongli[320] [海神动力 *haishen dongli*] (2021); Huayi Spacetime [华羿鸿达 *huayi hongda*] (2021); Dreame [追觅科技 *zhuimi keji*] (2017). This list

[316] Blaine Curcio, "Chinese Launch Provider Space Pioneer Announces New Funding, Rockets," *SpaceRef* (blog), July 19, 2023, https://spaceref.com/space-commerce/chinese-launch-provider-space-pioneer-announces-new-funding-rockets/.
[317] Liu et al. p.28
[318] Liu et al. p.47
[319] 2023 中国商业航天产业投资报告 Futurespace April 2024 China Space Conference
[320] No official English name could be found for the enterprise

doesn't include: Space Circling [天回航天 *tianhui hangtian*] (2021); Nayuta Space [千亿航天 *qian yi hang tian*] (2023) which are raised by other observers[321].

2. Gathering Data on Chinese Commercial Launchers Models

Difficulties encountered in drafting this subsection include the sources, particularly the lack of completely reliable and/or systematically organized sources regarding the technical characteristics of the products.

For private companies and CAS Space, a number of pieces of information on the launcher models and, where applicable, engines, are available on official websites, which are presented in a dedicated Annex E. *Commentaries on the official websites*. These data have the advantage of being reliable, but they are not updated in real time. Therefore, it is possible that they did not account for the latest announcements, especially for models in development. Furthermore, the information available is not standardized from one website to another; for example, thrust measurements are expressed in different units, payload capacity is not always indicated etc. Information concerning the launchers models of private and CAS Space enterprises were retrieved from the official websites in spring 2023, updated in October 2024, with minor changes noted between the two dates.

For SOE subsidiaries, ExPace and China Rocket, there is no official information available. Information is available on the Gunter Space Page blog, which has the advantage of offering standardized presentations but raises questions about the reliability of the information, as sources are not provided. Baike [百科][322], the PRC equivalent to Wikipedia, provides a number of sources in the references of the pages for the concerned models, which are articles from reputable outlets that can be qualified as reasonably reliable sources. The absence of official website reuniting technical information on the launchers models is another element to take in consideration when qualifying a more secretive, less transparent approach of the State-Owned sector in comparison with new commercial space enterprises.

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[321] Andrew Jones, "Chinese Rocket Engine Startup Space Circling Secures Funding," *SpaceNews* (blog), February 20, 2024, https://spacenews.com/chinese-rocket-engine-startup-space-circling-secures-funding/; "Nayuta Space signs contract with Aerospace Propulsion on January 19," X (formerly Twitter), July 18, 2023, https://x.com/CNSpaceflight/status/1748484246535295029.

[322] "Baike - Homepage," accessed April 4, 2025, https://baike.baidu.com/.

Payloads: For the payloads of the 64 recorded launches, I chose to list them based on the Gunter Space Page for practical reasons. The information could be verified against the COPUOS registration directory, which is a completely reliable official source but does not provide information on satellites that have not reached orbit (i.e., payloads from failed flights as well as payloads that are not intended to remain in orbit), and is also less convenient to navigate. Press articles published by Andrew Jones in Space News, a specialized media outlet, have also been used to supplement the information, as they are based on reliable Chinese sources cited in most cases.

3. *Launch: a Specific Sector Within a Growing Commercial Space*

As indicated by several reports mentioned in the Introduction, commercial space enterprises active in the launch sector in China have multiplied since mid-2014 up until today. This tendency aligns with the general trend of the emergence and rapid growth of commercial space.

"*The Chinese space sector has seen a lot of commercialization over the past 7 years, with well over 100 companies created, and around ¥40B (US$6.5B) raised by Chinese commercial space companies*."[323]

"*In about seven years, more than three hundred commercial space corporate entities were established and leading companies gradually emerged, which somehow bears some resemblance to the commercial space developmental trajectory in the West.*"[324]

Nonetheless, it is important to highlight the specificities of the launch sector, rather than assuming that the rise of commercial, particularly *minying*, launch enterprises is a natural extension of the overall growth in the commercial space industry.

As we analyzed from primary policy and regulatory texts in previous Chapter IV, commercial space policies in upstream segment of space activities only involved the launch sector in a belated fashion. In fact, companies involved in launch manufacturing and services account for a minor fraction of commercial space activities. According to data from FutureSpace Technology Research Institute, by the end of 2023, there were 537 registered and actively operating commercial space enterprises in China (excluding subsidiaries). The sectoral

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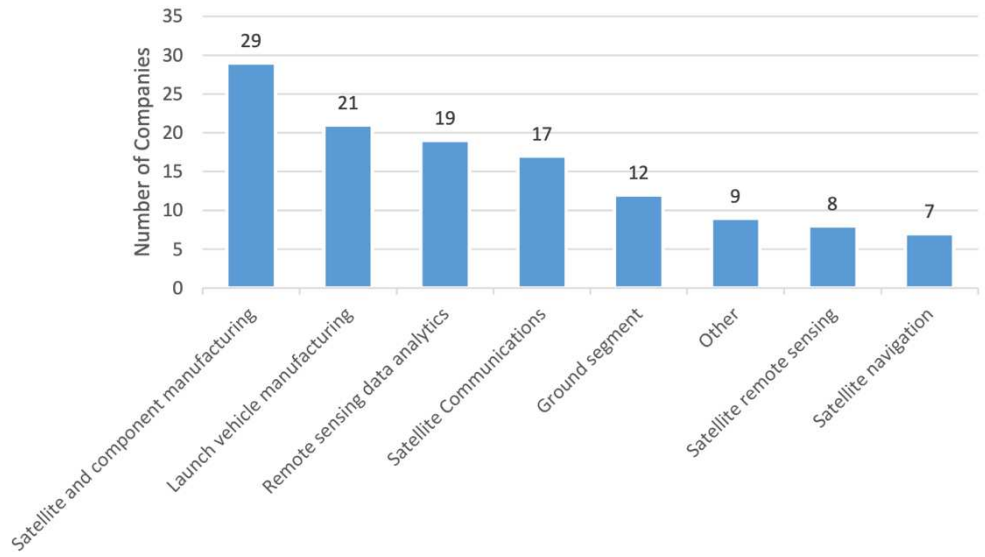
[323] "China's Space Sector: Commercialisation with Chinese Characteristics," *European Space Agency* (blog), April 2021, https://space-economy.esa.int/article/102/chinas-space-sector-commercialisation-with-chinese-characteristics.
[324] Han et al., "A PIE Analysis of China's Commercial Space Development." p.2

distribution of these companies is as follows: 140 companies in satellite manufacturing (26%); 140 companies in the ground segment (26%); 205 companies in satellite services (38%); and 52 companies in the launch sector, representing less than 10%.[325]

Below is a table from the 2019 IDA report, which categorizes commercial space enterprises according to different sectors. We can see that launch vehicle manufacturers rank second in this classification, accounting for 21 enterprises. However, the figure includes only 14 vehicle manufacturers, with the rest being component manufacturers. On the other hand, space services are divided into several categories, whose combined total surpasses launch activities, and even all upstream activities. For example, remote sensing data analytics, satellite communications, satellite remote sensing, and satellite navigation, that is one more than the combined total of satellite and component manufacturing and launch vehicle manufacturing.



Note: Some companies fall into more than one category so the total adds up to more than 78.

Figure 6. Distribution of Chinese Commercial Space Companies by Sector

The technologies related to launch vehicles present technical difficulties that are arguably unmatched by those in the manufacturing, even more so operation of satellites and downstream services. These include the design and testing of engines capable of achieving escape velocity; structural integrity and specific material to withstand the extreme forces, vibrations and

[325] Min Niu, "2023 China Commercial Space Industry Investment Report [2023 中国商业航天产业投资报告 2023 Zhongguo Shangye Hangtian Chanye Touzi Baogao]" (China Space Conference 2024, Wuhan, April 23, 2024).

temperatures during liftoff and in space while remaining lightweight; precise guidance and navigation systems to ensure trajectory accuracy.

This implies that the research and developpement (R&D) cost is high and time long, causing particular financing issues for private enterprises: investors will not see return for their investment before a long period of time, investment being the only source of finance for enterprises (salaries; R&D costs) over that period. This was also presented by several authors of the Chinese-language academic and specialized literature Chapter II as the "three high" [三高 *san gao*] argument. This state of affairs explains for the importance of publicity during the development period, as enterprises need to attract investors by convincing them of their technological reliability. As will be elaborated on later in Part 5, the importance of publicity and technical transparency to sustain need for external financing can be identified as a factor in major difference in corporate culture between private and mixed enterprises versus subsidiaries to SOEs.

Technologies related to space vehicles also involve substantial risk, which was also evoked by several authors in Chapter II, sometimes as a reason not to allow the entrance of *minying* entreprises. In Chapter IV, compliance with regulations regarding weapons and explosive also underlined this aspect. Launch vehicles rely on volatile fuels such as liquid oxygen, kerosene and methane, which are highly flammable and pose explosion risks. Failures during launch or ascent can result in accidents, leading to potential harm to people and infrastructure on the ground due to falling debris.

The functioning of a rocket involves a complex integration of systems, including propulsion, control systems, telemetry, sensors, avionics, and payload. The launch sequence must account for atmospheric resistance, stage separations, and, ultimately, orbital insertion successfully. Failure generally incurs the loss of the payload, with long lasting negative effects for the enterprise including loss of credibility in the eyes of investors and insurance maluses.

As Paulo Lozano director of the Space Propulsion Lab at the Massachusetts Institute of Technology, said in an interview to Andrew Jones of *SpaceNews*, "*developing new engines and rockets always brings significant challenges before they can become a force in the market*."

"*As with all rockets, it's about demonstrated reliability before you can be competitive. Launch costs are significant in any space project, but they're just a part of the overall investment. It's*

an expensive business as they'd need to demonstrate a few flawless launches before it's picked up by space users." [326]

Launch services do not represent the most lucrative sector within the broader space industry. While essential for getting payloads into space, they constitute a relatively small segment of the overall commercial space market. Once a satellite is in orbit, it can generate revenue for years by providing downstream services. In contrast, launch services are a one-time transaction, meaning that a company must constantly acquire new contracts to sustain revenue while taking into account high costs of developing, manufacturing, and launching rockets.

The demand for launch services is driven by the number of satellites and space missions being developed. A significant portion of it is captured by government launchers, for national institutional programs which represent the majority of launches. The access to such programs is a major stake for *minying* launch enterprises, which is particularly clear in Chapter II from the opinion defended by Shen Nian of *minying* enterprises trying to "break in" the besieged fortress of the government space system[327]. Liu Yufei on her hand, accused commercial space entreprises including mixed ownership ones to be "too lazy" when aiming to rely on State procurement[328]. This element was also raised in field interviews presented Chapter VII.

The remaining fraction of satellites—commercial, academic, and technological demonstration satellites, as identified in the table below—does not represent an overwhelming number, and this fraction is also partially captured by institutional launchers that are fully capable of providing such services. It must be mentioned that, in this context, commercial subsidiaries of CASC and CASIC mentioned in this study are not on an equal footing with private and CAS-mixed ownership enterprise.

Companies aspiring to commercialize orbital flight services now announce plans to deploy telecommunications and internet satellites in low Earth orbit. Indeed, the very survival of these companies arguably depends on mega constellation projects. In this regard, Landspace's co-funding of the Honghu satellite constellation is particularly revealing, echoing SpaceX's

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[326] Andrew Jones, "Commercial Chinese Companies Set Sights on Methalox Rockets, First Orbital Launches," *SpaceNews* (blog), July 10, 2018, https://spacenews.com/commercial-chinese-companies-set-sights-on-methalox-rockets-first-orbital-launches/.
[327] Shen, "Rediscussing 'Commercial Space' [zaiyi 'shangyehangtian'] 再议'商业航天.'"p.42
[328] Liu, "The Prospects of China Space Commercialization and Commercial Space [zhongguo hangtainshangyehua yu shangyehangtian de qianjing] 中国航天商业化与商业航天的前景."p.32

vertically integrated approach through Starlink by internally generating demand for its own launch services.[329]

As mentioned earlier, space launch vehicles manufacturing and services were not clearly present in the initial policy frameworks that opened the space sector to a wider range of investors and entrepreneurs. Launch vehicles are generally viewed as a strategic and sensitive technology, with governments maintaining tight control due to national security concerns, given the dual-use nature of rocket technologies, which belong to the same line as missiles. In the absence of early regulatory provisions, private companies faced limited access to key resources such as state-owned launch sites or technology transfer programs, and they likely struggled to secure the necessary funding due to the high perceived risks. Interviews conducted in the sector confirmed that the "first wave" of space launchers enterprises faced a lot of uncertainty.

4. Chronology: SOE Spin Offs Bandwagoning, Snowball Effect

Event	**Date**
Establishment of China Long March Rocket	1998
CASIC (?) Kuaizhou-1 first orbital launch attempt	mar-2012
Establishment of LinkSpace	janv-14
Establishment of Landspace	jun-15
Establishment of SpaceTrek	jun-15
Establishment of OneSpace	aug-15
Establishment of ExPace	feb-16
China Long March Rocket change of name	2016
Establishment of iSpace	oct-16
Establishment of Deep Blue Aerospace	nov-16
Establishment of Galactic Energy	feb-18
Landspace Zhuque-1 first orbital launch attempt	oct-2018
Establishment of CAS Space	dec-18
OneSpace OSM-1 first orbital launch attempt	mar-2019

[329] Andrew Jones, "Chinese Firm Files Plans for 10,000-Satellite Constellation," *SpaceNews* (blog), May 27, 2024, https://spacenews.com/chinese-firm-files-plans-for-10000-satellite-constellation/.

Establishment of Space Pioneer	apr-19
iSpace Hyperbola-1 first orbital launch attempt	Jul-2019
Establishment of OrienSpace	jun-20
Establishment of RocketPi	jun-20
Galactic energy Ceres-1 first orbital launch attempt	nov-2020
CAS Lijian-1 first orbital launch attempt	jul-2022
OrienSpace Yinli-1 first orbital launch attempt	01/2024
Space Pioneer Tianlong-2 first orbital launch attempt	apr-2024
China Rocket Jielong 1 first orbital launch attempt	august 2019

In terms of chronology, the creation of the first companies, LinkSpace and Landspace, both of which claim to be the first launch vehicle companies founded in China occurred in 2014 and 2015[330]. If taking into account all 20 space launch enterprises mentioned above launch vehicle companies were created at a rate of around two per year between 2014 and 2023.

Contrary to what some observers have suggested, 2014 *Guiding Opinions* was not the sole starting point for the private commercial launch sector in China, but an important factor among others. First, it was neither the first nor the only policy document to address commercial space activities. Second, it does not specifically deal with launch vehicles. Finally, other factors must also be taken into account.

As explained in Part 2 of this dissertation, commercial launchers sector in the PRC developed from rather vague political signals, but also largely according to a bottom-up dynamic driven by the founders of these companies, which is also underlined in the content of interviews presented in Chapter VII. The significance of the 2014 date for the creation of the first companies is not incidental. It also corresponds to the first successful Vertical Takeoff, Vertical Landing (VTVL) tests of SpaceX's Falcon 9, which had a major impact both in China and

[330] It's worth noting that Space Transportation, now involved in spaceplanes, was founded in 2012, but according to data available on Aiqicha, it wasn't until 2018 that it amended its business registration to include space activities

globally and played a significant inspirational role for commercial launch space companies founders, especially *minying*[331].

Subsequently, the well- publicized existence, financing, and activities (tests, launches) of several enterprises in a relatively small sector where information circulates quickly likely encouraged other founders to create companies and contributed to a certain "normalization" of the field. This is even more the case when CASIC and CASC established their own commercial spin offs in 2016. This "snowball effect", well emphasized during the interview with OrienSpace (Chapter VII exchange no. 3), as the practice gradually clarified the possibility of founding companies, recruiting talent from state-owned enterprises, and sourcing components, which is also underlined by Deville and Thibault[332]. This came alongside the enactment of more precise texts, notably at a provincial level, establishing a clearer framework.

In this context, it is particularly interesting to note that the subsidiaries of state-owned enterprises, ExPace and China Long March Rocket (CLMR), were founded and renamed, respectively, in 2016. CAS Space was founded in 2018. Hence, in the case of launch companies, we could to some extent talk of a form of "bandwagoning" of SOEs into a phenomenon that was *initially private*. Such a hypothesis aligns with the concept, developed in Part 1 of this dissertation, of state-owned enterprises "playing the market card". These chronological observations also support the hypothesis of a partly bottom-up, privately-led phenomenon in the launch vehicle sector.

China (Long March) Rocket is sometimes present in the listing of commercial space enterprises in China, but not in Chinese sources. Its status clearly not only stands out from private enterprises, as well as ExPace, and CAS Space. The enterprise was created in 1998 as a subsidiary to CASC's 1st Institute or CALT as China Asia-Pacific Mobile Telecommunications Satellite. Co. Ltd [亚太移动通信卫星有限责任公司 *yatai yidong tongxin weixing youxian gongsi*] (APMT) and changed its name in 2016 to China Long March Rocket (CLMR), often used in short as China Rocket, for commercializing some of CASC developed models[333]. After

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[331] Ling Xin, "China Catches up in Commercial Space: An Interview with Ji Wu," *National Science Review* 9, no. 7 (July 1, 2022), https://doi.org/10.1093/nsr/nwac065.
[332] Deville and Thibault, "La guerre des talents aura-t-elle lieu ?"
[333] "Exploring the Commercial Space Market: A Field Note on China Rocket Co. under CALT [航天科技一院中国火箭公司探路商业航天市场侧记 Hangtian Keji Yi Yuan Zhongguo Huojian Gongsi Tanlu Shangye Hangtian Shichang Ceji]," *China Aerospace Science and Technology Corporation* (blog), March 27, 2024, https://www.spacechina.com/n25/n2018089/n2018151/c4067930/content.html.Kun Cao, "The Establishment of China Long March Rocket Co., Ltd. Marks the Beginning of the 'Commercial Era' of Chinese Rockets [中国长征火箭有限公司成立　开启中国火箭的'商业化时代' Zhongguo Changzheng Huojian Youxian Gongsi

the change of name, China Rocket started commercializing launches for a new Jielong model. In the terms clarified in the first two parts of this dissertation, APMT qualifies typically as an enterprise of space "commercialization", but not a "commercial space" enterprise. However, a change of mission probably occurred together with the change of name, as APMT was primarily dealing with satellites whereas China Rocket is commercializing launch services for a new model of launchers.

Chengli Kaiji Zhongguo Huojian de 'Shangyehua Shidai'],"* *Xinhua*, October 19, 2016, http://politics.people.com.cn/n1/2016/1019/c1001-28792154.html. Rumeng Xiong, "Commercial Space National Team: Long March Rocket Unveils Its Nameplate, Offers Space Travel Services [商业航天国家队长征火箭公司揭牌：提供太空旅游服务 Shangye Hangtian Guojia Dui Changzheng Huojian Gongsi Jiepai: Tigong Taikong Lüyou Fuwu]," *The Paper*, October 20, 2016, http://news.ifeng.com/a/20161020/50129233_0.shtml.

B. Offer: Models Developed by the Main Commercial Space Launch Enterprises

1. General Presentation

The core business of commercial space launch companies in China studied revolves around a similar service: the placement of satellites into orbit. To provide this service, they design, develop, and manufacture launch vehicles.

Some companies also sell components, as seen on their official websites in Annex E. The sale of services, such as the rental and use of testing facilities, was also mentioned in interviews (Chapter 7, exchanges nos. 20, 27). Based on available information, we can assume that the sale of these products and services, which are not flight services, represents additional sources of revenue. As of October 2024, most of the companies studied rely primarily on investment as their main source of income. While Galactic Energy had conducted 14 successful launches as of May 2024, likely allowing it to generate revenue, the other launch companies that have completed at least one launch are still, for the most part, at the qualification stage. In this state of affairs, successful launches are primarily an opportunity for new rounds of financing, theoretically more lucrative—and even vital for the survival of these companies—than the fees paid for payload orbit insertion.

The launch vehicles developed by commercial space launch enterprises in China fall into two main categories: solid propulsion rockets and liquid propulsion rockets. Several observers agree that solid rockets represent essentially a first step and or a complement to liquid propulsion rockets for the enterprises that chose to develop it. That was the initial plan for Landspace's Zhuque-1 ; OneSpace's Linglong-1; iSpace's Hyperbola-1; Galactic Energy's Ceres-1; CAS Space's Kinetica-1 and OrienSpace's Gravity-1. All of the above then projected the development of a second model using liquid propulsion: Zhuque-2 and Zhuque-3 (Landspace), Hyperbola-2 (iSpace); Kinetica-2 (CAS Space); Pallas-1 (Galactic Energy); Gravity-2 and Gravity-3 (OrienSpace).

Some companies have only announced solid models, such as Space Trek's Tansuo-1 and Xingtu-1 or RocketPi's Darwin-2. However, in the case of the aforementioned companies, this may merely represent an initial phase in their development

Some companies are developing liquid launchers directly without going through the solid propulsion phase, that is the case of Deep Blue Aerospace that is developing reusable Nebula-

1 and Nebula-2 and space Pioneer, which was the first enterprises to put such a launcher in orbit in China with it's Tianlong-2 in April 2023.

Solid-fuel rockets can be considered as simpler in design, building and operation, which arguably makes them an ideal starting point for newer enterprises trying to break into the launch market. The fuel and oxidizer are pre-mixed and solidified, stored inside the rocket motor itself. Once ignited, the fuel burns until depletion, and the rocket is propelled. Solid rockets are reliable and easier to manufacture, however, they lack the flexibility of control once the burn starts, as the thrust cannot be adjusted, stopped, or restarted, which is necessary for reusability.

Solid-propulsion relative simplicity compared to its liquid rationale which is the probable rationale for enterprises that decided to start with this type of model. They also have shorter development timelines, which means companies can bring a product to market faster. For companies just entering the space sector, it is often more feasible to develop a solid rocket, first to gain experience as an entry point for mastering rocketry technologies, but also demonstrate basic capability, build credibility with investors and customers.

Exchanges with Alexandre Poirier, Research and Developpment Engineer at Airbus and aerospace engineer, shed interesting highlights on the choice of solid propulsion on the hand of commercial space start-ups, especially private enteprises and CAS Space that are developing new models. He underlined that technologies involved in the mastery of solid rocket propulsion were not that easy to master, notably the mixing of propellant, specific structure design for the launcher that had to be designed to withstand great pressure and temperature forces than liquid fueled-tanks, and the ability to resist erosion effect in the nozzle caused by aluminium particles.

In his opinion, solid propellant would be easier to develop "if the developer had previous experience, typically in missile programs", raising the question wether some of these companies had been founded by engineers or military personnel from the PLAAF. This question has been treated by Marc Julienne in his report *China's Ambitions in Space: The Sky's the Limit*, where he studies the school curriculum and prior professional background of some of the founders of commercial space launch companies[334]

Aerospace startups	Founders & board members	Institution of origin
iSPACE	PENG Xiaobo	CASC
	YAO Bowen	CASC
星河动力 GALACTIC ENERGY	LIU Baiqi	Beihang University - CASC
深蓝航天	HUO Liang	Tsinghua University - CASIC
LANDSPACE	ZHANG Changwu	Tsinghua University
	WU Shufan	Nanjing University of Aeronautics and Astronautics
	WANG Jianmeng	PLA
ONE SPACE	SHU Chang	Beihang University - CASC
	MA Chao	Beihang University - CASC
SPACE TREK	LIANG Jianjun	PLA
LINK SPACE AEROSPACE TECHNOLOGY GROUP	HU Zhenyu	South China University of Technology
	YAN Chengyi	Tsinghua University
	WU Xiaofei	N/A
	CHU Lengfei	Beihang University - CASC

While most of the founders have previous experience at CASC, in particular CASC, only two of them have experience in the PLA, and one at CASIC. It is the case of the cofounder of SpaceTrek, Liang Jianjun, and one co-founder of Landspace Wang Jianmeng, an enterprise that, as we have seen, engages now only in the liquid sector, albeit after a change of their initial business plan due to complications in their relationship with CASIC over the purchase of a solid motor, as developed in Chapter VII. The founder of Deep Blue Aerospace, Huo Liang a former employee from CASIC can also fall into this category, as his previous experience at CASIC, a military-related institution that essentially focuses on the solid segment. The background of

[334] Marc Julienne, "China's Ambitions in Space: The Sky's the Limit" (IFRI, January 2021), https://www.ifri.org/en/publications/etudes-de-lifri/chinas-ambitions-space-skys-limit.

these entrepreneurs are also precious clues as to the sourcings of components, in particular motors, although not a in a systematic fashion as the case of Landspace exemplifies.

Alexandre Poirier also underlined that to his knowledge, in Europe, all startups develop liquid-propellant launchers because they offer better performance were less complex to test, and test facilities were more accessible. This commentary points out to two different remarks. The first is the presence of a distinct technological and business model path for the development of commercial space launchers in China. The second is the technological filiation between the missile sector and the developpement of commercial space in China, highlighting another aspect of the influence of CMI. While abundantly treated in the literature, CMI is rarely treated under the technological angle. Concerning that argument, we must keep in mind that we are talking here, as discussed in the previous Part 2, of a military to civilian transfer, Military Civilian Intergration, MCI and access to facilities -possibly, as evoked by Airbus' engineer, testing facilities-.

As was said before, the technological choices of these enterprises are deeply intertwined with business model considerations. For example, in the case of Galactic Energy, solid rockets are a source of revenue and visibility to invest in the development of more advanced liquid launch vehicles. The same applies to OrienSpace, with an extra "spectacle" aspect. Launching "the heaviest solid rocket in China" from a barge at sea created a particularly striking image[335], potentially attracting more investors for a latecomer to the industry (Chapter VII exchange no. 27). The link is clear between the flourishing public communication of these companies and their funding model, which allows for more information to be gathered than in traditional space sectors. This can also be put in connection with the overtly critical commentaries of Shen Nian collected Chapter II concerning *minying* enterprises as trying to be "eye-catching" and "finding hotspots"[336].

Successfully launching solid rockets shows that the company has the capability to design and execute space missions. This helps them gain visibility and credibility in the eyes of both customers and investors. Once a solid rocket has been successfully launched, companies are

[335] "OrienSpace Launches Most Powerful Rocket by Private Chinese Firm," *Reuters*, January 11, 2024, sec. Space, https://www.reuters.com/technology/space/OrienSpace-launches-most-powerful-rocket-by-private-chinese-firm-2024-01-11/.
[336] Shen, "Rediscussing 'Commercial Space' [zaiyi 'shangyehangtian'] 再议'商业航天.'"

often able to secure additional funding for the development of more advanced liquid propulsion technologies, which require greater capital and expertise.

Liquid-fuel rockets use a separate liquid fuel and oxidizer, which are combined in the combustion chamber. This system allows for more control, as the engines can be shut down, and restarted mid-flight, making them adapted for complex orbital insertions and missions involving reusable rockets. However, liquid rockets are complex to design, manufacture, and operate. They require intricate pumping systems, sometimes also cooling mechanisms, and precise engineering to prevent explosions or other failures. Liquid rockets generally offer higher thrust and more efficiency, meaning they can carry heavier payloads into space, which is crucial for companies aiming to launch larger satellites or multiple payloads. Liquid propulsion is a necessary technology in order to mettre en service mega-constellations, as these large-scale projects require frequent launches and the ability to place satellites in precise orbits.

Developing liquid propulsion is a significant technological achievement, demonstrating advanced engineering capabilities. For commercial space launch enterprises, moving to liquid rockets not only opens up new market opportunities but also signals to investors, clients, and competitors that the company is capable of taking on more ambitious, cutting-edge projects.

Jean Deville describes the business model and technological path of early entrants as similar: first developing a small, solid rocket, then a liquid rocket with heavier payload capacity. The rationale behind this choice would have been the idea of progressive development, “starting small”, as well as the possibility to purchase solid motors off the shelf from SOEs.

According to him, a “shift in the market” would have occurred later in 2020s: while some enterprises “*believed in the solid launch market as a complement to larger reusable vehicles*”, such as iSpace and Galactic Energy – that already had successful launches with their solid rocket models- as well as CAS Space and OrienSpace, some other enterprises focused exclusively on liquid: Landspace, Deep Blue Aerospace, Space Pioneer. The decision of the latter enterprise would have been motivated by the difficulty to source solid engines from SOE in fact (as was seen in the case of LandSpace), and a crowded market for solid fueled vehicles (more applicable to Space Pioneer, a late entrant).

Early entrants developed their own motors: Landspace Tianque-12 for Zhuque-2; iSpace Jiaodian-1 for Hyperbola-2 methane, DBA Leiting-R1 Nebula-1; Galactic Energy Canqiong for Pallas-1; CAS Xuanyuan-2 for PR-2. All these were developed with reusability in mind, as

showed from specific technical capacities: multiple ignition, high throttling capabilities; thrust vectoring.

In contrast, new entrants would have tended to buy liquid motors: RocketPi buys Longyun motors from JZYJ; it is also the case of Space Epoch for the construction of its Yuanxingzhe-1. Space Pioneer purchases YF-102 from CASC's AALPT. They arrived as latecomer in an environment were mature enterprises specializing in rocket motors existed including JZYJ, as well as facilitated possibility to purchase from SOEs.[337]

Commercial launch companies in China are also betting on different technological niches. Both in field interviews and in the WeChat communication studied Part 5, the opportunity to work on new, sometimes unproven technologies is highlighted as a driving force for the creation of *minying* enterprises by entrepreneurs who previously belonged to SOEs, where such technologies were not necessarily exploited, either for reasons of reliability or path dependency.

One significant innovation introduced by some private enterprises is the use of a liquid oxygen and methane (LCH4) fuel mix: Landspace's Zhuque-2 and Zhuque-3, iSpace's Hyperbola-2, as well as models developed by RocketPi and JZYJ. Landspace achieved a major milestone by becoming the first enterprise in the world to successfully launch a LOX-methane-propelled vehicle in July 2022.

As noted by senior workers at CNES launcher division during an interview, while LOX-methane propulsion is regarded as a promising future technology, the most established companies are not among the most proactive in adopting it. This is due to their reliance on existing, well-established assembly lines, infrastructure, and manufacturing processes, illustrating an example of path dependency.

Methane is easy to produce and inexpensive. It is also more energy-dense than kerosene for the same mass and denser than hydrogen, easier to handle than hydrogen and with a storage temperature close to that of liquid oxygen. Additionally, the methane-oxygen mix has a higher specific impulse than the methane with kerosene one, meaning it can provide more thrust per unit of fuel mass. It offers cleaner combustion, which results in less soot buildup in engines. This reduces wear on rocket components, making engines more reusable.

[337] *Inside China's Reusable Rocket Program*, 2023, https://www.youtube.com/watch?v=DlxtmQLxEiI.

However, given that it is a relatively new fuel, this also implies a lack of compatibility with existing off-the-shelf motor components, and entails higher R&D costs. In an interview for Space News, Lozano of MIT's Space Propulsion Lab underlined the balance between technological innovation and economic rationales:

"*The cost of propellants, while a factor, are not really significant compared to the overall cost of building and launching a rocket […] while methane has lower molecular mass than kerosene and could have some advantages in performance, it has its complications as well, such as the need for cooling to become liquid and its lower density than that of kerosene (RP-1), for example, means a larger tank. […] Overall, high performance is always a good thing, but in practice some compromises are preferred in favor of reliability and costs*"[338]

Other innovations may be less fundamental but allow for cost reduction and/or greater efficiency. These technological solutions are highlighted in public communication of commercial launch companies on WeChat, as we will analyze Chapter VIII.

In the next subsection, we will present the models developed and announced by the 12 selected enterprises, along with their technical specifications, based on the sources mentioned in the previous section A.2.

[338] Jones, "Commercial Chinese Companies Set Sights on Methalox Rockets, First Orbital Launches."

2. Models

Chinese Commercial Space Private Enterprises – Orbital Launchers Models Details From Official Websites (**operational** and in development)

Name of the enterprise (english)	Launcher Models (eng)	Diameter (m)	Height (m)	Liftoff mass (T)	Propulsion	Take off Thrust (T)	Payload LEO	Payload SSO	Payload 700km	Reusability
LinkSpace										
	New Line 1	1,8	24	42	LOX/ Methane	51		200kg		Booster life 10 launches
Landspace										
	Zhuque-2, ZQ-2	**3,35**	**47,3**	**220**	**LOX/ Methane**	**282**	**4T**	**6T**		
	Zhuque-3, ZQ-3	fairing 5,2 rocket 4,5	76,6	660	LOX/ Methane	900	21,3T single launch; 18,3T sea return; 12,5T land return			20 times

SpaceTrek										
	Starway 01, Xingtu-1	1,4	21	30	Solid			240kg		
OneSpace										
	Linglong-1A		20	30	Solid				300kg	
	Linglong-2				Liquid		3-5T			
iSpace										
	OSM-1	1,2	19	21	Solid			112kg		
	Hyperbola-1, SQ1	**1,4**	**24**	**42**	**Solid**	**78,54**		**300kg**	**225kg**	
	Hyperbola-2, SQ 2	Fairing 3,35 2nd stage 2,25	28		LOX/ Methane	106	1,9T			
Deep Blue Aerospace										

	Nebula-1	3,35			LOX/ Kerosene	130	2T (8T modified version)	2T	1T	
	Nebula-2	5			LOX/ Kerosene	760	20T	20T		
Galactic Energy										
	Ceres-1	**1,4**	**2,5**		**Solid**	**60 stage1** **30 stage 2** **15 stage 3**	**400kg**	**300kg**		
	Pallas-1	4,2	8		LOX/Methane	350 stage1 60 stage 2	8T	17,5T		Yes
Space Pioneer										
	Tianlong-2, TL-2	**3,35**	**35**	**150**	**LOX/ Kerosene**	**190**	**2T**	**1,5T**		

	Tianlong-3, TL-3	fairing 4,2 rocket 3,8	71	590	LOX/ Kerosene	770	17T	14T		10 times
	Tianlong-3 Heavy, TL3H	fairing 5,2 rocket 3,8	85,2	1742	LOX/ Kerosene	2310	68T	42T		10 times
	TL3M	crewed capsule & rocket 3,8	67	580	LOX/ Kerosene	770	5T; intercontinantal transport 100 people			30 times
OrienSpace										
	Gravity-1 YL-1	**3,8-4,2**	**29,4**	**405**	**Solid**	**600**	**6,5T**	**4,2T**		
	Gravity-2 YL-2	fairing 4,2	70	715	LOX/ Kerosene	990	21,5T	15T	5,9 (geosynchronous)	
	Gravity-3 YL-3	fairing 5,2	70	1632	LOX/ Kerosene	2147	61T	38T	17T (geosynchronous)	
RocketPi										
	Darwin-2, DW2	1,4	24	21,4	LOX/Methane	30	300kg			

Chinese Commercial Space Mixed Ownership Enterprise from Chinese Academy Of Science Models – Launchers Details From Official Website

Name of the enterprise (english)	Launcher Models (eng)	Diameter (m)	Height (m)	Liftoff mass (T)	Propulsion	Thrust	Payload LEO	Payload SSO	Payload GEO	Reusability
CAS Space										
	Kinetica-1 **ZK-1**	**Fairing 2,65/3,35** **Rocket 2,65**	**30**	**135**	**Solid**	**200**	**2T**	**1,5T**		
	PR-1A	2,65	42	445	Solid	800				
	Kinetica-2, PR-2	Fairing 4,2 Rocket 3,35	37	628	LOX/ Kerosene	766	12T	8T		20 times
	Kinetica-2H	Fairing 4,2/5 Rocket 3,35	56	913	LOX/ Kerosene		22T	15T		
	Kinetica-3, PR-3	6	91	1800	LOX/ Kerosene	560	40T			100 times

Chinese Commercial Space SOE Spin Offs: Launchers Details From Various Sources

Name of the enterprise (english)	Launcher Models (eng)	Diameter (m)	Height (m)	Liftoff mass (T)	Propulsion	Thrust	Payload LEO	Payload SSO	Payload GEO	Reusability	Name of the enterprise (english)	Launcher Models (eng)
ExPace												
	Kuaizhou-1 KZ-1	**1,4**	**30**	**30**	**Solid**				**300/400kg**		**200kg**	
	Kuaizhou-1A KZ 1A	**1,2; 1,4**		**30**	**Solid**				**300kg**		**200kg**	
	Kuaizhou -11	**fairing 2,2; 2,6**		**78T(?)**	**Solid**						**1T**	
CLMR												
	Jielong-1 SD-1	**1,2**	**19,5**	**23,1T**	**Solid**					**200kg**	**150kg**	
	Jielong-3 SD-3	**2,64**	**31,8**	**140T**	**Solid**					**1,5T**		

3. *Analysis of Commercial Space Launch Companies by Launch Segment: Concentration on the Light and Ultra Light, Plans for Liquid Medium Lift*

In this subsection, the focus is exclusively on companies that have either conducted a launch or demonstrated significant progress and recent activity as of May 2024. As a result, LinkSpace, OneSpace, Space Trek, and RocketPi are not included in this synthetic overview.

As observed, the majority of operational launch vehicles fall within the solid-propellant rocket sector, where launch services represent a highly competitive and saturated market. In terms of launch frequency, the Kuaizhou-1A stands out as the most frequently launched vehicle. Its maiden flight took place in 2012—before ExPace was even established. The Ceres-1 from Galactic Energy ranks second, having successfully completed 14 flights.

Overall, spin-offs from state-owned enterprises (SOEs) and CAS Space benefit from a higher success rate, which could be explained by technology transfers from their parent organizations.

Three launch vehicles operate within the ultra-light launcher segment, with a payload capacity of less than 500 kg: ExPace's Kuaizhou-1A; Galactic Energy's Ceres-1; iSpace's Hyperbola-1.

Meanwhile, CAS Space's Kinetica-1, CLMR Rocket's Jielong-3, and ExPace's Kuaizhou-11 compete in the light launcher market, offering payload capacities ranging between 1.5 and 2 tons.

As explained in interview (Chapter VII, exchange no. 14), CAS Space initially aimed to differentiate itself from competitors by developing the most powerful solid-fuel launcher in China. However, the market entry of OrienSpace disrupted this strategy, as its launcher's capacity surpassed CAS Space in this category.

d. *Small-to-Medium Solid Lift Segment (≤8T to LEO)*

Company	**Rocket**	**LEO Payload**	**Status**
OrienSpace	Gravity-1	6.5T	Operational (1)
CAS Space	Kinetica-1 (ZK-1)	2T	Operational (3)
CLMR	Jielong-3 (SD-3)	1.5T	Operational (4)

ExPace	Kuaizhou-11	1T-1.5T (est.)	Operational (2S 1F)[339]
ExPace	Kuaizhou-1A	300-400kg	Operational (28S 1F)
Galactic Energy	Ceres-1	400kg	Operational (14S 1F)
iSpace	Hyperbola-1	300kg	Operational (3S 3F)

a. *Liquid-Fueled Medium-Lift Launchers (1-8T to LEO) and Heavy Lift Segment*

Other market segments have attracted fewer players and showcase more distinctive business strategies among companies. Space Pioneer is the first commercial company in China to have successfully launched a liquid-fueled rocket. The Tianlong-2 has a payload capacity of 2 tons, identical to the solid-fueled Kinetica-1 launcher developed by CAS Space.

LandSpace is the first company, both in the PRC and globally, to have successfully launched a rocket powered by liquid oxygen and methane. This positions it directly in the medium-lift launcher segment. However, in terms of payload capacity, the Zhuque-2 is comparable to OrienSpace's Gravity-1. First movers in segments not yet occupied by other competitors in terms of propulsion technology and payload capacity, neither of these launchers is reusable.

It is important to note that no concrete piece of information was found as to whether state-owned enterprise spin-offs, CLMR and ExPace, have any projects of developing in house or commercializing liquid-fueled rockets from their mother firms in the future. CLMR currently operates a medium solid-fueled launcher, Jielong-1. Beyond differences in their communication strategies—these companies do not have official websites detailing their operational and projected launcher models—their business model appears to be fundamentally different. Rather than developing independent designs, they likely primarily commercialize launch vehicles originally developed by their parent companies.

At first glance, ExPace has not independently developed solid-propulsion technology for space applications; the Kuaizhou series is derived from missile systems developed by CASIC.

[339] S stands for successful launch, F for failed launch

As for CLMR, will it eventually commercialize launch services for liquid-fueled Long March rockets? This scenario raises important questions, particularly regarding the duplication of roles between China Great Wall Industry Corporation (CGWIC)—which markets launch services for the Long March series—and China Long March Rocket (CLMR). This redundancy is further examined in the analysis of a WeChat post in Conclusion of this dissertation.

Company	Rocket	LEO Payload	Propulsion	Reusability	Status
Landspace	Zhuque-2	6T	LOX/Methane	No	Operational
Galactic Energy	Pallas-1	8T	LOX/Methane	Yes	In developpement
Deep Blue Aerospace	Nebula-1	2T (up to 8T future variant)	LOX/Kerosene	Yes	In development
Space Pioneer	Tianlong-2	2T	LOX/Kerosene	No	Operational
iSpace	Hyperbola-2	1.9T	LOX/Methane	Yes	In development

Company	Rocket	LEO Payload	Propulsion	Reusability	Status
Landspace	Zhuque-3	21.3T (single), 18.3T (sea recovery), 12.5T (land recovery)	LOX/Methane	20x reuse	Development phase
CLMR	Jielong-1	23.1T	Solid	No	Operational (1)
Space Pioneer		17T	LOX/Kerosene	10x reuse	In development
Deep Blue Aerospace	Nebula-2	20T	LOX/Kerosene	Reusable	In development
OrienSpace	Gravity-2	21.5T	LOX/Kerosene	Reusable	In development

b. *Ultra Heavy Lift Segment (≥50T to LEO)*

The ultra-heavy lift liquid-fueled launcher segment remains largely in the project and development phase. As its primary market concerns the deployment of large satellite constellations, it is not surprising that several companies have positioned themselves in this segment. It may also involve deep-space exploration, space station modules, and future lunar or Mars missions—domains that have so far remained under state control. However, as we will see in the next chapter (Chapter V.C), the CMSA is showing signs of opening up.

Company	**Rocket**	**LEO Payload**	**Propulsion**	**Reusability**	**Status**
Space Pioneer	Tianlong-3 Heavy	68T	LOX/Kerosene	10x reuse	In development
OrienSpace	Gravity-3	61T	LOX/Kerosene	Reusable	In development
CAS Space	Kinetica-3	40T	LOX/Kerosene	100x reuse	In development

This subsection, dedicated to analyzing the supply side of China's main commercial launch companies, identifies a clear concentration in the segment of light launchers. This category includes all operational private launch vehicles as well as Kinetica from CAS Space. The launch offering is particularly saturated in the solid-propellant light launcher segment, with seven operational models as of May 2024. The only operational heavy launcher currently available is a model from CLMR, the Jielong-1. The following section will focus on the demand for commercial launches, based on an analysis of the payloads from all launches carried out by commercial Chinese launch companies, as presented in Section B.

C. Demand: Launches Performed and Clients for the Payload

For this section, a comprehensive table was compiled, listing all launches conducted by commercial enterprises along with the specifications of their payloads, based on publicly available sources. Due to the length of the table, it has been placed as the Annex D. A condensed version of the table, excluding payload specifications, is provided below.

1. List of Launch from Commercial Space Enterprises

Launcher enterprise	**Date**	**Launcher model**	**Launch Status**	**Launch center**
ExPace	17/03/2012	Kuaizhou-1T	Success	Jiuquan
ExPace	25/09/2013	Kuaizhou-1	Success	Jiuquan
ExPace	21/11/2014	Kuaizhou-1	Success	Jiuquan
ExPace	09/01/2017	Kuaizhou-1A	Success	Jiuquan
ExPace	29/09/2018	Kuaizhou-1A	Success	Jiuquan
Landspace	27/10/2018	Zhuque-1	Fail	Jiuquan
OneSpace	27/03/2019	OSM-1	Fail	Jiuquan
iSpace	25/07/2019	Hyperbola-1	Success	Jiuquan
China (Long march) Rocket	17/08/2019	Jielong-1	Success	Jiuquan
ExPace	30/08/2019	Kuaizhou-1A	Success	Jiuquan
ExPace	13/11/2019	Kuaizhou-1A	Success	Jiuquan
ExPace	17/11/2019	Kuaizhou-1A	Success	Jiuquan
ExPace	07/12/2019	Kuaizhou-1A	Success	Taiyuan
ExPace	07/12/2019[340]	Kuaizhou-1A	Success	Taiyuan
ExPace	16/01/2020	Kuaizhou-1A	Success	Jiuquan
ExPace	12/05/2020	Kuaizhou-1A	Success	Jiuquan
ExPace	10/07/2020	Kuaizhou-11	Failure	Jiuquan
ExPace	12/09/2020	Kuaizhou-1A	Failure	Jiuquan
Galactic Energy	07/11/2020	Ceres-1	Success	Jiuquan
iSpace	01/02/2021	Hyperbola-1	Failure	Jiuquan
iSpace	03/08/2021	Hyperbola-1	Failure	Jiuquan
ExPace	27/09/2021	Kuaizhou-1A	Success	Jiuquan
ExPace	27/10/2021	Kuaizhou-1A	Success	Jiuquan
ExPace	24/11/2021	Kuaizhou-1A	Success	Jiuquan

[340] Two launches reported on the same day

Galactic Energy	07/12/2021	Ceres-1	Success	Jiuquan
ExPace	15/12/2021	Kuaizhou-1A	Failure	Jiuquan
iSpace	13/05/2022	Hyperbola-1	Success	Jiuquan
ExPace	22/06/2022	Kuaizhou-1A	Success	Jiuquan
CAS SPACE	27/07/2022	Lijian-1	Success	Jiuquan
Galactic Energy	09/08/2022	Ceres-1	Success	Jiuquan
ExPace	23/08/2022	Kuaizhou-1A	Success	Xichang
ExPace	06/09/2022	Kuaizhou-1A	Success	Jiuquan
ExPace	24/09/2022	Kuaizhou-1A	Success	Taiyuan
Galactic Energy	16/11/2022	Ceres-1	Success	Jiuquan
ExPace	07/12/2022	Kuaizhou-11	Success	Jiuquan
China (Long march) Rocket	09/12/2022	Jielong-3	Success	Tai Rui (barge)
Lanspace	14/12/2022	Zhuque-2	Fail	Jiuquan
Galactic Energy	09/01/2023	Ceres-1	Success	Jiuquan
ExPace	22/03/2023	Kuaizhou-1A	Success	Jiuquan
Space Pioneer	02/04/2023	Tianlong-2	Success	Jiuquan
iSpace	07/04/2023	Hyperbola-1	Success	Jiuquan
CAS SPACE	07/06/2023	Lijian-1	Success	Jiuquan
ExPace	09/06/2023	Kuaizhou-1A	Success	Jiuquan
Lanspace	12/07/2023	Zhuque-2	Success	Jiuquan
ExPace	20/07/2023	Kuaizhou-1A	Success	Jiuquan
Galactic Energy	22/07/2023	Ceres-1	Success	Jiuquan
Galactic Energy	10/08/2023	Ceres-1	Success	Jiuquan
ExPace	14/08/2023	Kuaizhou-1A	Success	Xichang
Galactic Energy	25/08/2023	Ceres-1	Success	Jiuquan
Galactic Energy	05/09/2023	Ceres-1S	Success	Yellow Sea “Defu” (barge)
Galactic Energy	21/09/2023	Ceres-1	Failure	Jiuquan
Galactic Energy	04/12/2023	Ceres-1	Success	Jiuquan
China (Long march) Rocket	05/12/2023	Jielong-3	Success	Borun Jiuzhou
Landspace	08/12/2023	Zhuque-2	Success	Jiuquan
Landspace	08/12/2023	Zhuque-2	Success	Jiuquan
iSpace	16/12/2023	Hyperbola-1	Success	Jiuquan
ExPace	25/12/2023	Kuaizhou-1A	Success	Jiuquan
ExPace	27/12/2023	Kuaizhou-1A	Success	Jiuquan

ExPace	05/01/2024	Kuaizhou-1A	Success	Jiuquan
OrienSpace	11/01/2024	Yinli-1	Success	Dong Fang Hang Tian Gang (barge), Yellow Sea
ExPace	11/01/2024	Kuaizhou-1A	Success	Jiuquan
CAS SPACE	23/01/2024	Lijian-1	Success	Jiuquan
China (Long march) Rocket	03/02/2024	Jielong-3	Success	Borun Jiuzhou
China (Long march) Rocket	03/02/2024	Jielong-3	Success	Borun Jiuzhou[341]
ExPace	21/05/2024	Kuaizhou-11	Success	Jiuquan
Galactic Energy	29/05/2024	Ceres-1S	Success	DF Hangtian Gang (barge)
Galactic Energy	30/05/2024	Ceres-1	Success	Jiuquan
Galactic Energy	06/06/2024	Ceres-1	Success	Jiuquan
iSpace	10/07/2024	Hyperbola-1	Failure	Jiuquan
Galactic Energy	29/08/2024	Ceres-1S	Success	Jiuquan

2. Market Segments and Client Profiles in Commercial Launches

a. *Earth Observation*

To analyze the table including the payload in Annex D. List of launches completed by Chinese commercial space launchers, both individual satellites and satellite clusters launched were counted, including both successful and failed launches. If a cluster of satellites of the same model was launched in a single mission, it was counted as one entry. For the overall count, only satellites with an identified function were considered. For the count of clients, satellites were included only if at least the manufacturer, and preferably the final client, was identified.

In this subsection, we will primarily focus on launch manufacturers and contracting entities for launch services in the fields of Earth observation satellites and Telecommunication satellites. Although satellites categorized under Demonstration, which included technology demonstration and scientific experiments represent a significant portion of launches, their clients are often not clearly identified: seven universities and schools can be identified in the full table in Annex to Part 3. Additionally, it is likely that a number of these satellites include demonstration payloads for the launch companies themselves, which was identified in two

[341] Same remark

instances. In such cases, these satellites do not represent a genuine market but rather serve as part of the qualification process for their respective launchers.

The satellites launched by commercial enterprises in the broadest sense can be categorized into three groups. Out of 103 identified satellites and satellite clusters, 51 fall under Earth observation in a broad sense, including optical observation, synthetic aperture radar (SAR), and meteorology. 34 are dedicated to technology demonstrations and scientific experiments (Demonstration), while 16 are related to Telecommunication, including M2M and IoT systems. A more detailed classification of satellite types could serve as an interesting research avenue, this dataset could provide a starting point for such an analysis.

According to the table's findings, as of May 2024, Earth observation represents the primary market for commercial launch enterprises, accounting for half of the identified satellites and satellite clusters. Among the 49 satellites and clusters categorized under this segment, 15 were launched by Galactic Energy, 13 by ExPace, 8 by CLMR, 6 by CAS Space, 4 by iSpace, and 1 each by Landspace, OrienSpace, and Space Pioneer (organized chronologically). This indicates that all commercial enterprises that have conducted identifiable satellite launches have entered this market.

Galactic Energy and ExPace appear to be in direct competition in this sector as of May 2024. While these figures should be interpreted with caution due to the limitations of the counting method, in particularly the lack of information on several launches, they still provide a general indication of market trends. Although spin-offs from CASIC and CASC are among the leading launchers in this category, the gap in the number of satellites launched is not particularly large between CLMR, CAS Space (a mixed spin-off of CAS), and iSpace.

On the demand side, CGSTL stands out as the main client, being associated with 15 satellites and satellite clusters. Minospace follows with 7, including satellites from Guoxing Aerospace Tech and Xingyun-6.

For these contracting entities, launches have been carried out by various commercial launch providers, spanning different types of enterprises, including minying firms, SOE spin-offs, and mixed-ownership CAS companies. CGSTL entrusted the launch of 7 satellites and clusters to ExPace, 2 each to CLMR, Galactic Energy, and iSpace, and 1 to CAS Space. Minospace relied on CAS Space for 4 launches, CLMR for 2, and Galactic Energy for 1. Xiyong Microelectronics Industrial Park turned to ExPace for 4 launches and Galactic Energy for 1.

This situation is particularly noteworthy given that the commercial clients themselves are of different types. CGSTL is a mixed-ownership enterprise originating from a CAS laboratory, while Minospace is a *minying* company. Chongqing Xiyong Microelectronics Industrial Park [重庆西永微电子产业园区 *chongqing xiyong weidianzi chanye yuanqu*] is a high-tech industrial zone overseen by Chongqing Municipal People's Government[342].

This leads to an important conclusion: *in theory, the type of commercial enterprise does not necessarily determine its ability to secure contracts with other types of companies or entities*. However, in practice, the extent to which satellite manufacturers and operators choose to work with launch providers of different types remains an open question. CGSTL does not appear to favor CAS Space at this stage. Minospace contracts launches across different types of companies. Although Xiyong Industrial Park has primarily relied on ExPace for its launches, it has also turned to Galactic Energy, indicating that an entity supervised by a local government can freely choose a private commercial provider.

Two additional points merit attention. First, the only client clearly identifiable as a non-commercial public institution, the National Remote Sensing Center of China, has contracted two launches with ExPace. This suggests that an institutional body can engage in agreements with CASIC's spin-off. However, there is no available example of similar contracts being awarded to private or mixed-ownership enterprises linked to CAS, leaving the question open as to whether such agreements are possible.

Second, the dataset includes one launch for a foreign entity: Egypt's National Authority for Remote Sensing and Space Sciences (NARSS), which developed its satellite jointly with Berlin Space Technologies. Although partnerships between minying commercial space enterprises and foreign entities have been publicly announced, this remains the only concrete example of an international commercial launch. The broader issue of commercial launch contracts is further explored in the last subsection of this Chapter.

Several factors may explain why ExPace and CLMR dominate this segment. Regulatory constraints likely play a role, which as we explored in Part 2 on the policy framework advantage during field interviews advantage SOE that have long term familiarity with the authorization system, especially before its clarification with the 2019 *Notice*. Reliability is also a key

[342] "Baike - Chongqing Xiyong Microelectronics Industrial Park," Baike, accessed April 4, 2025, https://baike.baidu.hk/item/%E9%87%8D%E5%BA%86%E8%A5%BF%E6%B0%B8%E5%BE%AE%E7%94%B5%E5%AD%90%E4%BA%A7%E4%B8%9A%E5%9B%AD%E5%8C%BA/10006380.

consideration. The launch vehicles developed by *minying* enterprises and CAS Space are newer and still undergoing qualification. Institutional bodies, whether domestic or foreign, may prefer the reliability of proven launch systems.

b. *Telecommunication*

16 of the identified satellites or satellite clusters fall under the broad category of communication. This category includes Internet of Things (IoT) and Machine-to-Machine (M2M) communication satellites, as well as broadband internet satellites.

ExPace leads this segment with eight launched satellites. Galactic Energy has conducted four identifiable communication-related launches, while CLMR has carried out two.

The majority of satellites in this category are intended for IoT and M2M constellations, totaling 14 satellites. The primary client in this segment is Guodian Gaoke, a private Chinese commercial space company specializing in the construction and operation of the Tianqi (Apocalypse) Low Earth Orbit (LEO) satellite constellation, which aims to provide IoT communication services.[343] Guodian Gaoke manufactured 7 satellites through Shanghai ASES and entrusted four launches to Galactic Energy, two to CLMR, and one to ExPace.

HEAD Aerospace Group is a private Chinese company founded in 2007, headquartered in Beijing, with subsidiaries in Hong Kong, the Netherlands, and France, along with multiple international partnerships. HEAD entrusted two batches of satellites to ExPace and one to CLMR for a sea launch as part of its "Skywalker" constellation. This constellation is designed to provide Internet of Things (IoT) communication services, including data collection and tracking capabilities.

Xingyun is a Chinese space-based IoT initiative developed by the China Aerospace Science and Industry Corporation (CASIC)[344]. The 2 launch services it contracted were carried out via ExPace.

Geespace, a subsidiary of Geely, China's major automobile manufacturer, developed the GeeSAT-1 satellites to support autonomous driving, precise navigation, and V2X (Vehicle-to-

[343] "Guodian Gaoke: One of China's First (IoT) Constellations to Take Shape - Dongfang Hour," September 15, 2021, https://dongfanghour.com/guodian-gaoke-chinas-first-constellations-to-take-shape/.
[344] "China Launches 2 Satellites for IoT Project," Xinhua edition, accessed April 4, 2025, http://www.china.org.cn/china/2020-05/13/content_76037814.htm.

Everything) communication. The company contracted ExPace for a launch, which ended in failure.

Two identifiable satellites categorized under "communication" in a broad sense fall within broadband internet services. The final clients for these launches were, on the one hand, KLEO Connect, initially a Sino-German joint venture between Shanghai Spacecom Satellite Technology (SSST) and EightyLeo, which is effectively the predecessor of SpaceSail, a major contender in the internet broadband megaconstellation race against China SatNet. On the other hand, Galaxy Space's Yinhe-1 served as a technology demonstration satellite for GalaxySpace's planned 144-satellite global 5G communications constellation. [345]

As with Earth observation satellites, those classified under communications originate from a diverse range of actors.

The landscape of communication satellites launched by commercial enterprises is characterized by the involvement of companies with distinct ownership structures, including CASIC-linked firms such as Xingyun, State-owned media China Central Television (CCTV) alongside space *minying* companies like Guodian Gaoke and HEAD Aerospace, Sino-German joint venture KLEO Connect, automobile giant Geely subsidiary Geespace.

Furthermore, the mix of clients relying on different launch providers reflects a degree of fluidity in contract allocations. commercial satellite operators do not appear to be exclusively tied to specific launch providers. While Xingyun has relied exclusively on CASIC's spin-off ExPace, other companies, such as Guodian Gaoke, distribute their launches among multiple providers—including Galactic Energy, CLMR, and ExPace—. This indicates that enterprise choices in securing launch services is far from being systematically determined by institutional affiliations. but also include factors such as reliability records, technical capabilities, financial considerations and launch delay.

c. *Public Demand*

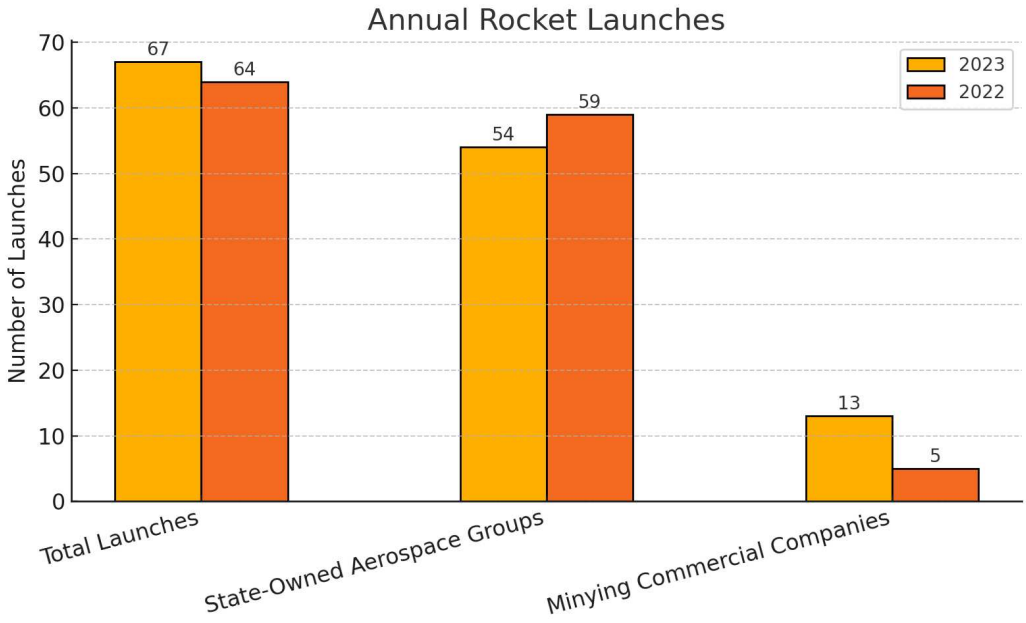
As seen in the table on launches, the satellites launched by commercial enterprises are primarily commercial satellites and university satellites. Some series of satellites are launched by

[345] "Yinhe 1, 2," Gunter's Space Page, accessed April 4, 2025, https://space.skyrocket.de/doc_sdat/yinhe-1.htm.

multiple different companies, suggesting competition among these companies for the same clients.

The following graph comes from the presentation given by FutureSpace at the *Commercial Space Industry International Forum* of the CSC 2023, and has been reedited for the sake of clarity [346]. As can be observed, commercial launches by *minying* enterprises remain significantly outnumbered compared to those conducted by state-owned enterprises.

The terminology used in the original language of the graph clearly differentiates between "minying commercial enterprises (such as Galactic Energy, Landspace, etc.), while subsidiaries of state-owned enterprises (ExPace and China Long March Rocket) are classified under "State-Owned Aerospace Groups". The classification of CAS Space launches remains unclear, as it is usually not considered a "group" [集团 *jituan*].



Despite the increasing presence of *minying* enterprises in China's commercial space sector, the question of their access to public demand remains ambiguous. While the state has encouraged investment diversification and the entry of non-state and private -social and popular- capital into the space industry as I have seen in previous Chapter III, the extent to which *minying* launchers can compete for publicly funded missions remains uncertain.

[346] Niu, "2023 China Commercial Space Industry Investment Report [2023 中国商业航天产业投资报告 2023 Zhongguo Shangye Hangtian Chanye Touzi Baogao]."

One of the key challenges lies in the justification of public investment in state-developed launch vehicles with equivalent or overlapping capabilities. Given that CASC and CASIC already provide a full range of launch services, the government may struggle to rationalize funding new entrants that offer similar payload capacities without a clear strategic differentiation, a point that was raised both by Shen Nian[347] and by Mathieu Grialou at presentation of work at the French Embassy in China after the first field research in May 2023. This dynamic creates potential barriers to market access for *minying* firms, particularly when government-backed programs prioritize existing SOE-built rockets.

Another factor influencing access to public demand is the institutional presence of SOEs in decision-making bodies an was hinted during an interview with a scholar specialized in Chinese Space law at an University of Political Science and Law (Chapter VII, exchange no. 6). While their presence was not directly identifiable in Part 2 of this dissertation covering the primary policy and regulatory framework for commercial space and commercial space launch activities, State-owned enterprises and their subsidiaries remain deeply embedded within China's aerospace policy ecosystem, influencing regulatory frameworks, funding mechanisms, and procurement decisions. While some *minying* firms have benefited from local government partnerships or state guidance funds, their ability to compete on equal footing with SOE-backed launch providers remains limited.

Furthermore, the relative immaturity of *minying* launchers is also a constraint. While these companies have demonstrated rapid technological progress, their qualification levels for high-stakes government missions remain comparatively low. Unlike SOEs with decades of experience and state-certified launch systems, many *minying* firms are still proving the reliability of their rockets through initial demonstration flights and commercial contracts. Until these vehicles achieve a track record of high success rates and technical validation, their eligibility for state procurement contracts may remain restricted.

The box below presents a relevant example: the China Manned Space Agency (CMSA)'s call for bids for a low-cost cargo transportation system for the Tiangong space station. It serves as an instructive case study on the evolving procurement strategies in China's space sector.

The CMSA calls for bids

[347] Shen, "Rediscussing 'Commercial Space' [zaiyi 'shangyehangtian'] 再议'商业航天.'"

On January 6, 2021, CMSA announced a first solicitation for proposals to explore low-cost cargo transportation methods, aiming to supplement the Tianzhou cargo delivery system[348]: "*In order to enrich the cargo transportation channels during the operation and application stages of the space station, it is planned to explore and develop low-cost cargo transportation methods, form a necessary and beneficial supplement to the basic material transportation system, and build a flexible, efficient, diverse and low-cost cargo transportation system.*" The requirements for cargo delivery were divided among inbound and outbound flights, they included in the first case: 1) payload capacity of 1-4 tons for outbound flights, 2) 45 days response window between the product leaving the factory to the cargo being transported to the space station to complete the rendezvous and docking, 3) transferability of cargo to the station by astronauts or other methods, removal and controlled deorbiting of station waste, 4) transportation costs aligned with international standards. For return trips: 1) 100-300 kilograms payload capacity; 2) ability to indicate the position after landing in order to reduce the requirements for measurement, control, communication, search and rescue during the return process. Candidates could propose a complete system for space station cargo transportation or carry out design work on specific components (carrier rockets, cargo spacecraft, return vehicles etc.) until February 28, 2021. The results for this call for bids was, to our knowledge, not made public.

On May 16, 2023, the CMSA issued a second call for proposals for a low-cost global cargo transport system for the Tianzhou space station. This call for proposals explicitly references commercial solutions:

"In order to further reduce the cost of uplink cargo transportation for the space station, enhance the flexibility of uplink cargo transportation, and explore the development of commercial aerospace models, we are now issuing an announcement to the whole society to solicit proposals for the overall plan of the low-cost cargo transportation system for the space station.

[348] Andrew Jones, "China Gears up for Space Station, Cargo and Crewed Mission Launches," *SpaceNews* (blog), January 7, 2021, https://spacenews.com/china-gears-up-for-space-station-cargo-and-crewed-mission-launches/.CMSA, "Announcement on Soliciting Proposals for 'Low-Cost Cargo Transport for Space Station Operations' [关于征集'面向空间站运营的低成本货物运输'方案设想的公告 guanyu Zhengji 'mianxiang Kongjian Zhan Yunying de Di Chengben Huowu Yunshu' Fang'an Shexiang de Gonggao]," *WeChat*, 06 2021, https://mp.weixin.qq.com/s?__biz=MzI0NTU3MTk1Nw==&mid=2247491622&idx=1&sn=d33385f43b182c5db728c9eaa6eb3401.

[…]In the future, our office will organize the selection and development of the low-cost cargo transportation system and flight verification based on the solicitation of proposals, and purchase low-cost cargo transportation services on the market, and ultimately build a safe, reliable, diverse and cost-effective space station ground-to-earth cargo transportation system."[349]

The call for proposition concerns a "*comprehensive plan for the integration of a low-cost cargo transportation system including cargo transportation aircraft, carrier rockets and launch support.* "*The specific plan should include mission requirement demonstration, main functions and indicators, domestic and foreign development, cargo transport spacecraft technology plan, launch vehicle selection and launch support plan, interface with related systems, main key technologies, safety and reliability design, business model, development process, development basis and funding needs*". The technical conditions for applying to the call for proposals were detailed in a separate document. The CMSA's official WeChat post focuses on the profile of eligible companies: established for over three years, possessing qualified personnel, and demonstrating strong management quality, especially in financial aspects.etc.

On September 26, 2023, the results of the second call for proposals were made public[350]:

"*A total of nine entities, including the CAS Institute of Microsatellite Innovation, the first, fifth, and eighth institutes of CASC, the AVIC Chengdu Aircraft Design and Research Institute, Azspace, MinoSpace, Interspace Explore, and OrienSpace, submitted ten proposals. Four entities—the CAS Institute of Microsatellite Innovation, the fifth and eighth institutes of CASC, and the AVIC Chengdu Aircraft Design and Research Institute—received technical support to begin the detailed design phase of the program.*"

Although the commercial companies that participated were ultimately not selected, the fact remains that these opening of a call for tenders for institutional activities, in this case the human spaceflight program, to both traditional state-owned enterprises as well as private and mixed

[349] "Announcement on Soliciting Overall Proposals for a Low-Cost Cargo Transport System for the Space Station [征集空间站低成本货物运输系统总体方案的公告 guanyu Zhengji Kongjian Zhan Di Chengben Huowu Yunshu Xitong Zongti Fang'an de Gonggao]," CMSA, accessed April 4, 2025, https://www.cmse.gov.cn/gfgg/202305/t20230515_53551.html.

[350] CMSA, "Announcement | Preliminary Results of the Proposal Solicitation for the Overall System of Low-Cost Cargo Transport to the Chinese Space Station 公告丨中国空间站低成本货物运输系统总体方案征集初选结果公告 [Gonggao | Zhongguo Kongjian Zhan Di Chengben Huowu Yunshu Xitong Zongti Fang'an Zhengji Chuxuan Jieguo Gonggao]," *WeChat*, accessed April 4, 2025, https://mp.weixin.qq.com/s/pbbaWs9Zj9rXP5OEIBlmAw.

companies are a first. This clearly highlights how institutional space activities are usually closed off to private companies, currently offering them no access to institutional demand.

The question of why such a call for bids was issued is worth asking. This approach is quite original; during our research, I have not come across other public calls for bids for launch offers. This suggests that usually, for satellite launch requests, the allocation of demand is not done through such a public call for bids but rather through direct negotiations, internal agreements with established state-owned enterprises, or closed government contracts.

Is this the result of an internal process unique to CMSA, a specific body in the Chinese space program? Andrew Jones draws a parallel with NASA's Commercial Resupply Services (CRS) program, which awarded contracts in late 2008 to Orbital Sciences Corp. and SpaceX, to see first cargo flights to the International Space Station in 2012[351]. As discussed in Conclusion, a shift in the communication strategies of state-owned enterprises through their subsidiaries is underway for launch service offers, including public calls for bids and auctions. This change in approach has been identified as, if not a direct result of the emergence of commercial space activities, at least a phenomenon that coincides with it.

d. *International Launch Market*

While foreign observers mention the potential of international markets for commercial companies, particularly private ones, several obstacles arise in practice for these enterprises.

The PRC is one of the world's largest exporter of space technologies, including satellites, as was hinted in the study of successive *Space Activities White Papers* Chapter IVL As Nathaniel Rome synthetized: "*Since 1990, China has launched 77 satellites for foreign customers (73 successfully) and exported 17 satellites, which have accelerated in recent years. China has made advancing its space exports a national priority, with a dedicated space export promotion agency, generous financing, and clear political and regulatory support.*"[352]

Bhavya Lal, a researcher at the IDA Science and Technology Policy Institute, underlined in an interview for *SpaceNews* that: "*investment in commercial launch companies is a sign of optimism, but the future of China's commercial launch industry depends not on investment*

[351] Andrew Jones, "China Calls for Space Station Commercial Cargo Proposals," *SpaceNews* (blog), May 16, 2023, https://spacenews.com/china-calls-for-space-station-commercial-cargo-proposals/.
[352] Rome, "China's Space Export Strategy."p.1

alone but also on its ability to acquire customers, whether it is the Chinese government and SOEs, or foreign entities that would need to be willing to work with Chinese launch providers."[353] The report she co-authored also mentions the issue of "brand image" of China abroad impacting all companies in high-tech sector, associated with "failures to protect foreign intellectual property and concerns about its military capabilities". [354]

On one hand, U.S. export controls limit the ability for payloads containing ITAR-listed components to transit through China and be launched by Chinese launchers, a concern regularly raised in field interviews dertailed Chapter VII.

On the other hand, the prevalence of state-owned enterprises in bilateral transactions involving the People's Republic of China (PRC) could impede the capacity of private companies to seek significant international clients. Currently, China-foreign space partnerships follow a "turnkey" model that includes satellite manufacturing, launching, and sometimes operational support and/or training of local personnel in both upstream and downstream processes[355]. These contracts fall within the framework of government-to-government bilateral relations and are systematically concluded by the China Great Wall Industry Corporation (CGWIC), which could until recently be considered an established monopoly. Diplomatic considerations and prestige come into play, which transcend mere commercial logic. If private commercial partners were to emerge under a "business-to-business" model, the situation might be different. Finally, one element to consider is the relatively low reliability of current private launchers, which likely compromises the authorization to launch for third-party states or companies.

Announcements and launches also indicate partnerships with foreign entities, either realized or not through launches, such as Landspace and GOMspace, LinkSpace, but these are limited.

Chapter Conclusion

This chapter has provided a comprehensive assessment of the commercial launch sector in China as of May 2024, analyzing both the supply of launch services and the nature of existing demand. On the supply side, it identified a concentration of operational launchers in the ultra-light and light solid-propellant segments, with a growing number of enterprises having

[353] Andrew Jones, "China's Landspace Raises $175 Million for Zhuque-2 Launch Vehicles," *SpaceNews* (blog), September 9, 2020, https://spacenews.com/chinas-landspace-raises-175-million-for-zhuque-2-launch-vehicles/.
[354] Liu et al., "Evaluation of China's Commercial Space Sector."pp.88-89
[355] For a thourough study on the topic, see: Rome, "China's Space Export Strategy."

announced to transitioning toward liquid propulsion technologies, particularly those seeking to position themselves in higher-payload or reusable launcher markets, in particular for the deployment of mega-constellations.

The diversity of ownership structures—from private minying firms to SOE spin-offs and CAS-affiliated enterprises—translates into distinct business models and technological strategies. Private firms typically operate under greater financial pressure, relying heavily on rounds of private investment to sustain lengthy R&D cycles, and therefore place particular emphasis on visibility, public communication, and rapid demonstration of technological milestones. Their technological choices often reflect a dual imperative: to attract investor confidence and to carve out niches such as reusable or methane-based liquid launchers.

By contrast, SOE spin-offs like ExPace and China Long March Rocket benefit from deeper institutional backing, more stable funding channels, and access to mature technologies developed by their parent organizations. These advantages often allow them to operate with reduced market pressure, focusing on the commercialization of already-established technologies rather than pursuing innovation. CAS-affiliated enterprises, occupying a middle ground, combine some entrepreneurial characteristics of minying firms with the reputational capital and resource access associated with the state sector.

On the demand side, Earth observation remains the dominant application segment, followed by telecommunications payloads. The diversity of clients—ranging from mixed-ownership firms and universities to foreign entities and public institutions—suggests a heterogeneous market in which no clear segmentation by enterprise type is observable in practice. While minying firms have made significant technological progress, their access to public procurement remains constrained. Participation in international commercial launches is limited by regulatory and diplomatic considerations.

Part 4 – Main Commercial Launch Enterprises Financial Data analysis: Three Distinct profiles, a Multiplicity of Stakeholders

In the Introduction and previous Parts, we established that commercial launch companies in China can be divided into three categories: private or *minying* enterprises (LinkSpace, LandSpace, Space Trek, OneSpace, iSpace, Deep Blue Aerospace, Galactic Energy, OrienSpace, and RocketPi); spin-offs from state-owned enterprises (ExPace and China Long March Rocket [CLMR]); and hybrid companies originating from the Chinese Academy of Sciences (CAS).

Part 3 of this dissertation presented a market assessment of China's commercial launch sector, based on a supply and demand analysis of the 13 main commercial launch enterprises. This analysis allowed us to draw connections between the different company groups, their respective levels of technological maturity—with SOE spin-offs typically more advanced—and their market positioning, with more intense competition observed among *minying* firms and CAS Space.

In Part 4, we turn our attention to financial data collected on these commercial space launcher enterprises registered in China from publicly accessible sources. This includes an examination of the shareholding structures of the companies studied, as well as the distribution of their wholly owned subsidiaries, structured according to the same three-group typology. This organizational framework enables general observations about firms within the same group, particularly private companies. These findings constitute the quantitative counterpart to our broader effort to characterize Chinese commercial space launcher enterprises. The final section, Part 5, will seek to offer a qualitative characterization, based on discourse produced by these companies through fieldwork interviews and online sources.

VI. Chapter VI – Diverse Ownership, Distributed Presence: Financial Data on Commercial Space Enterprises

This Chapter VI is dedicated to the presentation and analysis of the structure of investment in the subscribed capital of a selection of 13 commercial space launch enterprises. The first part of this Chapter will present the methodology followed to retrieve data retrieved from publicly accessible repositories, namely Aiqicha and Tianyancha (Chapter VI.A). Then, a presentation and analysis for the shareholding structure of a selection of 13 commercial space launch enterprises as organized in three groups: *minying* or private enterprises, SOE spin offs, CAS derived-mixed ownership company (Chapter VI.B.) This third section of this Chapter focuses the geographical distribution of wholly owned subsidiaries of the 13 commercial space enterprises studied.. Like the previous section, it is organized according to enterprise types: private enterprises (Chapter VI.A.), SOE spin offs (Chapter VI.B.) and CAS-affiliated mixed ownership company (Chapter VI.C.).

Main findings

The analysis of financial data, particularly shareholding structures and the geographic distribution of wholly owned subsidiaries, confirms the relevance of the typology developed earlier in this dissertation, distinguishing between private enterprises, SOE spin-offs, and mixed ownership CAS affiliated structures. These categories materialize in concrete patterns of capital structure, investor profiles, and territorial strategies.

Private enterprises exhibit a strong internal funding structure, with founders and senior employees playing a central role in early-stage capital formation. In the 2020 sample, their combined share represented the majority of investment (56.85% on average); in 2023, this share remained substantial at 52,83%, though diluted by the arrival of new external investors, especially in the most established companies. The capital subscribed by private enterprises ranges widely—from as low as 1.08 million RMB (approximately 142,000 EUR) for LinkSpace to 372.09 million RMB (around 49 million EUR) for iSpace. This variation illustrates the diversity in fundraising capacity and reflects differing levels of maturity and success in the launch market.

The composition of private capital is diverse, involving private equity, management and investment firms, publicly listed companies, and, importantly in a few cases, local guided investment funds [引导基金 *yindao jijin*] Notably, local funds were identified in companies

such as Deep Blue Aerospace and OneSpace, suggesting illustrating a mean of policy support at the municipal or provincial level. On the other hand, no central government actor appears among the main shareholders of any private company analyzed.

SOE spin-offs, represented in this study by ExPace (CASIC) and China Long March Rocket (CASC), are distinguished by significantly higher subscribed capital—859.4 million RMB for ExPace and 219.62 million RMB for CLMR in 2023—though the gap with top private firms has narrowed over time. Their shareholder bases are dominated by institutional entities affiliated with their respective parent groups.

These firms also benefit from access to central-level guided funds, such as the National Military-Civil Fusion Industry Investment Fund, which appears as a minority investor in both spin-offs. This form of support illustrates the privileged access of SOE-affiliated commercial entities to state-backed strategic financing tools.

CAS Space lies between the two models. Its subscribed capital (42.32 million RMB in 2023) is modest compared to SOE spin-offs and leading private actors. Nearly 77% of its investment originates from Beijing-based CAS-related entities, including the Institute of Mechanics and CAS-affiliated investment platforms and minority shares of private capital. Unlike private enterprises, founders or executives are not among its shareholders.

Private commercial launch enterprises demonstrate a clear pattern of territorial diversification through the establishment of wholly owned subsidiaries. While Beijing remains a core location for most companies, several other provinces, such as Shaanxi, Shandong, Hainan, and Zhejiang, have attracted significant activity. These geographic footprints reflect not only the firms' growth strategies but also regional industrial advantages and possibly local incentives for space-related development.

In contrast, the subsidiaries of SOE spin-offs appear geographically concentrated. Hubei and Shanghai host the vast majority of these companies and their parent organizations, with little evidence of expansion into other regions. This strong regional clustering and the scarcity of other commercial enterprises there could suggest a degree of local protectionism.

The subsidiary network CAS Space bears strong resemblance to that of private actors in both scope and distribution. Headquartered in Guangdong, it has established technological and industrial hubs there and in Beijing, along with medium-sized branches in Hainan, Shandong, and Xi'an—common destinations among private firms. Notably, it also has a base in Hunan, a

location not selected by any other enterprise in the sample, which could point to a strategic, forward-looking investment plan.

In sum, the study confirms that the structure of shareholding, the role of institutional investors, and the spatial footprint of the enterprises correlate strongly with their institutional affiliation and type. These financial and territorial configurations provide critical insight into how commercial space enterprises operate in China, grow, and are embedded within national and local support mechanisms. They also highlight the fragmentation of financing channels and the highly diverse institutional ecosystems, nuancing the dichotomy often seen in English-language literature between 'state-led' and 'private' commercial space actors as we presented in the Introduction. This diversity complicates any straightforward interpretation of commercial space as the product of a centralized industrial masterplan.

A. Gathering Data on Aiqicha and Tianyancha

3. Collection of Data in April 2020 and May 2023

The database underpinning this analysis was first established in August 2020 on 8 Chinese commercial launch enterprises: LinkSpace, Land Space, Space Trek, OneSpace, iSpace, Deep Blue Aeospace, Galactic Energy and ExPace[356]. These companies were selected according to crossed reference of existing literature on commercial space sector in China, both in mandarin and English[357].

In May 2023, a second round of data collection was conducted from the PRC during field-research, incorporating five additional enterprises. The sample included three new private enterprises: Space Pioneer, OrienSpace, RocketPi as well as the mixed ownership enterprise CAS Space and spin off to CASC CLMR.

Due to evolving legal restrictions on the public use and dissemination of business registry data in the PRC, the full shareholder database compiled for this research has not been included in the final research.

4. Gathering Data from Online Corporate Directories

The data on which the 2020 tables are based was retrieved end September 2020 from the website Aiqicha[358], which is owned and operated by Baidu[359]. Aiqicha is an online platform that brings together public data relating to a large number of Chinese companies, themselves stemming from government databases mainly established under the social credit system, including the National Enterprise Credit Information Publicity System [全国企业信用信息公

[356] The selection included JZYJ and Aerospace Transportation, which are now specialized respectively in engine manufacturing and a spaceplane. Consequently, the decision was made to exclude them from the initial sample and the subsequent data collection. The enterprises are presented by order of creation. The results of the first data collection were published in an article Lucie Sénéchal-Perrouault, "A Chinese New Space? Commercial launch enterprises within national economic reform," *Entreprises et histoire* 102, no. 1 (May 31, 2021): 149–71, https://doi.org/10.3917/eh.102.0149..

[357] Zhang Geng et al., « 2019 中国商业航天产业研究报告 Research on Space Industry in China 2019 » Yiou intelligence, November 2019; « Commercial Space Industry Research Topics—Commercial Rockets slowly rising 商业航天产业研究专题—商业火箭 冉冉升起 », Essence Securities, 5 June 2019; Irina Liu et al., « Evaluation of China's Commercial Space Sector ». ; « Thoughts on the "Hype" about China's NewSpace Launcher Startups – (Part 1/2) », *The China Aerospace Blog*, 12 September 2019, https://china-aerospace.blog/2019/09/12/thoughts-on-the-hype-about-chinas-newspace-launcher-startups-part-1/.

[358] Aiqicha, Homepage, https://aiqicha.baidu.com

[359] Aiqicha, About us, https://aiqicha.baidu.com/fs/about

示系统 *quanguo qiye xinyong xinxi gongji xitong*][360] and National Public Credit Information Center [国家公共信用信息中心 *guojia gonggong xinyong xinxi zhongxin*][361].

Data from Aiqicha present a reasonable degree of reliability: the two above-mentioned governmental platforms are fed by administrative organs at the local level, in particular administrative departments for industry and commerce [工商行政管理部门 *gongshang xingzheng guanli bumen*] that are in charge with enterprise registration. According to relevant legal and regulatory provision of PRC, local administrative bodies have an obligation make certain information public through the corporate credit information publicity system, including filing information[362]. Registered enterprises have a duty to provide annual reports to the administrative department for industry and commerce through the same channel. The publicity of the information used for the elaboration of the tables below is compulsory, including: establishment and purchase of equity by enterprises; amount of capital subscribed and paid by its shareholders or promoters; equity changes[363]. The publicity of other information, such as: the number of employees, total assets, total liabilities, external guarantees, total owner's equity, total operating income, main business income, total profits, net profits, and total tax payments is at the enterprise's discretion[364].

Due to difficulties accessing Aiqicha, the second round of data collection was conducted using the Tianyancha platform, which offers similar features and presentation to those of Aiqicha. Access to both those platforms has been rendered impossible from abroad in May 2023[365]. Hence, it was not possible to verify the data at a latte date, increasing the chances of error.

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[360] Aiqicha, User conditions, https://aiqicha.baidu.com/fs/protocol; National Public Information Publicity Center, http://gsxt.saic.gov.cn

[361] National Public Credit Information Center http://www.creditchina.gov.cn/

[362] See in particular : "Interim Regulations on the Disclosure of Enterprise Information" State Council of People's Republic of China, 23 July 2014 http://www.gov.cn/zhengce/content/2014-08/23/content_9038.htm ; "Regulations on the Disclosure of Government Information of the People's Republic of China", State Council of People's Republic of China, 3 April 2019 http://www.gov.cn/zhengce/content/2019-04/15/content_5382991.htm

[363] "Interim Regulations on the Disclosure of Enterprise Information", Article 6

[364] Ibid, Article 9

[365] "China Slashing Foreign Subscriber Access to Key Research Database," Nikkei Asia, accessed April 7, 2025, https://asia.nikkei.com/Politics/International-relations/China-slashing-foreign-subscriber-access-to-key-research-database; Eduardo Jaramillo, "Cut off from China's Data and Info, Overseas Academics, Analysts Get Crafty," The China Project, July 6, 2023, https://thechinaproject.com/2023/07/06/cut-off-from-chinas-data-and-info-overseas-academics-analysts-get-crafty/; Julie Zhu, Xie Yu, and Julie Zhu, "China's Top Financial Data Provider Restricts Offshore Access Due to New Rules," *Reuters*, May 4, 2023, sec. Finance, https://www.reuters.com/business/finance/chinas-top-financial-data-provider-restricts-offshore-access-due-new-rules-2023-05-04/.

For the data gathered on both those platforms, it should be noted that, due to the lack of access to the original spreadsheets, there remains a slight uncertainty regarding the percentages, particularly the decimal places. The ratio between the value of the shares subscribed by each investor, the total subscribed capital, and the corresponding percentage was verified; however, minor variations within a hundredth of a percent may persist.

B. Shareholding structure

1. *Minying Enterprises: Start-ups Controlled by Their Founders With a Diversity of Investors*

Subscribed Capital:

In terms of subscribed capital, significant differences exist among the private enterprises studied as of 2023, ranging from as little as 1.08 million RMB for LinkSpace (approximately 142000 EUR[366]) to several hundred million RMB: iSpace: 372.09 million RMB (48.96 million EUR); LandSpace: 205.17 million RMB (26.99 million EUR), with an average around 73.04 million RMB (9.61 million EUR). Five enterprises show between 20 and 34 million RMB of subscribed capital (2.63 to 4.47 million EUR), two between 12 and 14 million RMB (1.58 to 1.84 million EUR).

If there was a significant gap between the subscribed capital of the SOE subsidiary ExPace and private companies during the initial data collection in 2020, this gap has narrowed for the largest private companies for the second data collection in 2023.

The amount of subscribed capital and its evolution since 2020 for the studied enterprises reflect their capacity to raise funds from investors rather than relying, on financing from founders and executives, hence reflecting to an extent the advancement of these enterprises. The five best-funded companies are also the most active in the development and launch of their rocket models.

Of the 10 enterprises studied, 6 are headquartered in Beijing: iSpace, LandSpace, Deep Blue Aerospace, Galactic Energy, LinkSpace and Space Trek. OrienSpace is based in Shandong, Space Pioneer, Deep Blue Aerospace and RocketPi in Jiangsu, OneSpace in Chongqing. The study of wholly-owned subsidiaries reveals that these private enterprises have a geographically diversified presence.

Enterprise	**Province**	**City**	**Capital mio RMB**	**Capital mio EUR**
iSpace	Beijing	Beijing	372.07	48.96
Landspace	Beijing	Beijing	205.17	27.0

[366] The exchange rate of May 2023, approximately 1 EUR = 7.6 RMB was applied for conversion

OrienSpace	Shandong	Yantai	34.87	4.59
DeepBlue Aeospace	Jiangsu	Wuxi	24.59	3.24
Galactic Energy	Beijing	Beijing	23.92	3.15
Space Pioneer	Jiangsu	Zhangjia	20.79	2.74
OneSpace	Chongqing	Chongqing	20.50	2.7
Space Trek	Beijing	Beijing	14.84	1.95
RocketPi	Jiangsu	Taicang	12.53	1.65
LinkSpace	Guangdong	Shenzhen	1.07	0.14

a. *Preliminary Results: The Importance of Founders in the Shareholding*

2020 Data Collection Results

The first analysis of the data collected in 2020 on the investors of seven private launcher companies showed first of all the importance of the founders and senior workers in the structure of the financing of their own companies. This presence took two forms that can still be identified in 2023: first, investment made directly by investors, members of the board and supervisors of the enterprise to the subscribed capital. Second, investment through funds that are either entirely owned of directed by such members, used as financial vehicles to finance these enterprises which are their only target investment, which will be referred to as "indirect investment".

Company / Shareholder	**Capital Contribution (Mio RMB)**	**Capital Contribution (Mio EUR)**	**% of Total Subscribed Capital**
LinkSpace	**0.09**	**0.01**	**76,19%**
Individual - Direct	0.06	0.01	55,19%
Individual - Indirect	0.02	0.00	21,00%
Landspace	**53.52**	**6.97**	**37,03%**[367]
Individual - Direct	22.36	2.91	15,47%

[367] It is noticeable that for Landspace, there is a significant difference in the amount of capital investment from the founders between the first and second data collections. This difference could be due to an error in identifying the indirect funds.

Individual - Indirect	31.16	4.05	21,56%
Space Trek	**10.00**	**1.30**	**75,04%**
Individual - Direct	3.00	0.39	22,51%
Individual - Indirect	7.00	0.91	52,53%
OneSpace	**9.90**	**1.29**	**50,71%**
Individual - Direct	6.90	0.90	35,34%
Individual - Indirect	3.00	0.39	15,37%
iSpace	**10.37**	**1.35**	**44,65%**
Individual - Direct	0.37	0.05	1,60%
Individual - Indirect	10.00	1.30	43,05%
Deep blue aerospace	**11.00**	**1.43**	**52,38%**
Individual - Direct	6.29	0.82	29,96%
Individual - Indirect	4.71	0.61	22,42%
Galactic Energy	**10.00**	**1.30**	**56,68%**
Individual - Direct	5.60	0.73	31,74%
Individual - Indirect	4.40	0.57	24,94%

The participation in the capital subscribed by natural persons is easily identifiable on the online directories used, as names of individuals would appear rather than the name of funds. Further research showed that, in the vast majority of cases, natural persons investors are either founders of companies operating as CEO, or assuming senior positions such as board member or supervisor of the company. Interviews revealed that employees at all levels are also encouraged to acquire share in the enterprise under the form of an Employee Share Ownership Plan (ESOP) (exchanges nos. 5 and 9, Chapter VII)[368].

This type of investment accounted for nearly a quarter (23.8%) of the total subscribed capital in 2020. More generally, the individuals involved were often among the top investors in terms of capital contribution.

In the case of LinkSpace, individual investments represented over 50% of the total subscribed capital in 2020. The share invested by the co-founder Hu Zhengyu represented 55.19% of the

[368] The data available on Aqicha and Tianyancha allows us to identify individuals as senior management, but not all employees. In doubt, when natural persons where identified, the qualification "Individual- Other" was used.

total that is 62.68 kRMB (approximately 8.25 kEUR). iSpace and Landspace represent the lowest share of investment to capital by natural persons, respectively 6.93% and 15,47%.

Further analysis of the database allowed us to identify a number of investment funds that were either composed only of leading members of the enterprises, or composed of a mix of them and unidentified natural persons. What these funds have in common is that they invested exclusively in the launch manufacturing enterprise in question, effectively functioning as special financial vehicles.

One of the clearest examples is Space Trek's Beijing Space Trek Technology Development Center, a special purpose vehicle named after the launcher enterprise itself. All of its board members are Space Trek leaders, and the fund holds a 52.53% stake in the company's subscribed capital, amounting to 7 million RMB (0.92 million EUR). Beijing LinkSpace Future Technology Innovation Center, having invested 21% of the enterprise's, 23.85 kRMB (3.14 kEUR), subscribed capital presented the same characteristics. The same scenario was present for Galactic energy Beijing Zhiyuan Exploration Management Consulting Center, 24.94%, 4399 kRMB (578.82 kEUR); and Deepblue Aerospace Ningbo Meishan Bonded Port Area Kejida Investment Management Partnership, 22.42%, 3000kRMB (394.74 kEUR).

In the case of iSpace, several such funds can be spotted: Guangzhou Weicong Investment Management Partnership, Guangzhou Shanyong investment management partnerships for the former represents 43,05% of the shares.

The cumulation of direct and indirect investment by the founders led us to the preliminary conclusion that the vast majority of the subscribed capital of Chinese space manufacturing enterprises in 2020 was in the hands of its founders, which clarified their nature as private. Arguably, it also gave the founders considerable leeway to decide how to run their businesses. At the notable exception of Landspace, the total of this direct and indirect investment represented around or more that 50% of the shares in 2020. These initial results allowed us to reinforce the hypothesis that the companies studied are indeed start-ups, in the sense that they were young enterprise for which the founders invested significant amounts and took personal risk.

2023 Data Collection Results

Company/ Shareholder	Capital contribution Mio RMB	Capital contribution Mio EUR	% of Total Subscribed Capital
LinkSpace	**0.77**	**0.10**	**71.70%**
Individual - Direct	0.56	0.07	52.17%
Individual - Indirect	0.21	0.03	19.53%
Landspace	**104.03**	**13.51**	**50.70%**
Individual - Direct	45.88	5.96	22.36%
Individual - Indirect	58.15	7.55	28.34%
Space Trek	**10.06**	**1.33**	**67.74%**
Individual - Direct	3.06	0.40	20.58%
Individual - Indirect	7.00	0.92	47.16%
OneSpace	**9.73**	**1.28**	**47.47%**
Individual - Direct	6.73	0.89	32.84%
Individual - Indirect	3.00	0.40	14.63%
iSpace	**160.72**	**21.17**	**43.20%**
Individual - Direct	5.75	0.76	1.55%
Individual - Indirect	154.97	20.41	41.65%
Galactic Energy	**10.00**	**1.32**	**41.81%**
Individual - Direct	5.60	0.74	23.41%
Individual - Indirect	4.40	0.58	18.40%
Deep Blue Aerospace	**11.25**	**1.48**	**45.74%**
Individual - Direct	6.29	0.83	25.58%
Individual - Indirect	4.96	0.65	20.16%
Space Pioneer	**9.79**	**1.29**	**47.08%**
Individual - Direct	6.29	0.83	30.24%
Individual - Indirect	3.50	0.46	16.83%
OrienSpace	**21.92**	**2.89**	**62.87%**
Individual - Direct	0.38	0.05	1.10%
Individual - Indirect	21.54	2.84	61.77%
RocketPi	**9.35**	**1.23**	**74.60%**
Individual - Direct	7.25	0.96	57.84%

Individual - Indirect	2.10	0.28	16.76%

For three of the seven first enterprises studied, the invested share by the founders remained the same or comparable in absolute terms, but decreased in relative terms: Deep Blue Aerospace; Galactic Energy; Landspace. To a certain extent, it is also the case for OneSpace, to the notable exception that the absolute value of share of Shu Chang also decreased, which is a unique case.

Two companies experienced significant changes in the absolute value of shares held by their founders. For iSpace, the absolute value of founder-held shares increased fifteenfold. However, their relative share remained around 1.5% of the total, as the company's registered capital increased by the same proportion between 2020 and 2023.

The study of the capital structure of the three companies added to the sample in 2023 confirms the investment structure analyzed previously, which gives a predominant role to the founders, whether directly or indirectly.

As of 2023 data collection, seven companies in the sample fell below the 50% threshold of shares directly or indirectly held by their founders: LinkSpace, Landspace, OneSpace, iSpace, Deep Blue Aerospace, Galactic Energy, and Space Pioneer. Nevertheless, in all cases, the founders remain the largest individual investors.

With the exception of Jiangsu Jiequan Kaitong Intelligent Manufacturing Industry Investment Fund, which holds an 11.14% stake in Deep Blue Aerospace, all other investors across the various companies that are neither direct nor indirect investment by the founders hold shares below 9%. The remaining minority investment, which is highly fragmented, would require a detailed study that could be the subject of future research.

In the following subsection, we examine the shareholding structure of each enterprise, focusing on the main investors, whose combined shares account for approximately 70% of the total subscribed capital. While founders remain the primary stakeholders, the investor base also includes private equity funds, management and investment private enterprises, publicly listed state-owned companies, and local government-guided funds—hybrid investment vehicles designed to channel public capital into priority industries.[369]

[369] For an indepth study on the topic, see H. Chen, M. Rithmire, "The Rise of the Investor State: State Capital in the Chinese Economy".

b. *Detailed Analysis: a Diversity of Profiles in Main Shareholders*

LinkSpace

Origin	Nature	Name	% Total	Mio RMB	Mio EUR
Individual	Individual - Direct	Hu Zhenyu	52,17%	0.56	0.07
Beijing	Individual - Indirect	Beijing LinkSpace Future Technology Innovation Center 北京翎航未来科技创新中心(有限合伙)[370]	19,53%	0.21	0.03
Individual	Individual - Other	Chu Longfei	6,77%	0.07	0.01

The investment structure of LinkSpace, whose subscribed capital is the smallest at just over 1 million RMB, is distinctive. The founders are the primary source of funding, holding 71.70% through two shareholders. An additional 16.30% of the investment is held by other natural persons, for whom the available data does not establish a direct link to the company.

The financial structure of LinkSpace and the amounts invested suggest that it operates more like a small startup. The evolution of economic indicators—including the disappearance of several subsidiaries between the first data collection in 2020 and the second in 2023 presented in the next subsection—as well as interviews conducted within the company (anonymized), confirm significant financial difficulties resulting in a lack of clients for LinkSpace niche, suborbital flight. The company currently survives by leasing out its testing facilities. It also operates a suborbital launch site in Qinghai province, which has hosted several of its test flights.

LandSpace

Origin	Nature	Name	% Total	Mio RMB	Mio EUR

[370] For the sake of clarity, only the Chinese characters are put in the table, not the pinyin pronunciation

Jiangsu	Individual - Indirect	Huaian Tianhua Technology Information Consulting Center 淮安天绘科技信息咨询中心(有限合伙)	19,39%	39.79	5.24
Individual	Individual - Direct	Zhang Changwu	16,40%	33.65	4.43
Beijing	Beijing	Beijing Silk Road Spacecommunication Investment Management Center 北京丝路航通投资管理中心(有限合伙)	8,95%	18.36	2.42
Jiangsu	Individual - Indirect	Huaian Landspace Enterprise Management Partnership 淮安蓝箭企业管理合伙企业(有限合伙),	8,95%	18.36	2.42
Xinjiang	Xinjiang	Xinjiang Goldwind Technology 新疆金风科技股份有限公司	8,30%	17.03	2.24
Jiangxi	Jiangxi	Gongqingcheng Chuangxiang Blue Arrow Investment Management Partnership 共青城创想蓝箭投资管理合伙企业(有限合伙)	6,94%	14.24	1.88
Individual	Individual - Direct	Tong Miao	5,96%	12.23	1.61

The investment in Landspace's subscribed capital is relatively dispersed compared to the other companies studied, with seven investors collectively holding less than 75% of the subscribed capital.

Among the main investors in Landspace, there are two indirect investments made by founders and executives of the enterprise, Huaian Tianhua Technology Information Consulting Center and Huaian Landspace Enterprise Management Partnership, as well as two direct investments by the founder, Zhang Changwu, and Chief Technology, Tong Miao. Four other entities are also involved:

Zhang Changwu holds 23.54% of the shares in Beijing Silk Road Hangtong Investment Management Center. As Landspace appears to be the fund's only known investment, this may suggest it serves as an indirect investment vehicle for the company’s founders and executives.

However, the available information does not allow this to be confirmed with certainty. Other known partners include Zhang Chen, Vice President at Landspace, and the Anji Bohang Enterprise Management Consulting Partnership, whose internal composition is not publicly disclosed.

If this does indeed constitute an indirect investment, the total share held by the founders and executives would amount to approximately 53.69%.

Xinjiang Goldwind Science & Technology, is a listed enterprise in Shenzhen and Hong Kong stock exchanges specializing in the design, manufacturing, and servicing of wind turbines, as well as the development and operation of wind farms. Xinjiang Wind Energy Company holding a significant share in it, it is a SOE.

Gongqingcheng Chuangxiang Landspace Investment Management Partnership is a private equity investment entity focused on project and industrial investment.

Space Trek

Origin	Nature	Name	% Total	Mio RMB	Mio EUR
Beijing	Individual - Indirect	Beijing Space Trek Technology Development Center 北京星途共进科技发展中心(有限合伙)	47,16%	7.00	0.92
Individual	Individual - Direct	Liang Jianjun	10,11%	1.50	0.20
Shandong	Shandong	Tongfang Investment 同方投资有限公司	8,16%	1.21	0.16
Weifang	Shandong	Weifang Hangdong Aerospace Investment Partnership 潍坊航动空天投资合伙企业（有限合伙）	5,37%	0.80	0.11

The investment in Space Trek's subscribed capital is quite concentrated, with 70.8% of shares held by four investors. Among them, the founder, Liang Jianjun, directly holds 57.27% of the shares. Additionally, three other members of the company have each invested 3.37%, and there is an indirect investment from the Beijing Space Trek Technology Development Center.

Tongfang Investment is a state-owned investment firm that focuses on seed and early-stage investments in high-tech sectors, including industrial automation and biotechnology, primarily in Shenzhen and Haidian, China.

Weifang Hangdong Aerospace Investment describes itself as an equity investment firm targeting the aerospace sector. It also invested in Beijing Yuhang Propulsion Technology Co., Ltd. in 2021

OneSpace

Origin	Nature	Name	% Total	Mio RMB	Mio EUR
Individual	Individual - Direct	Shu Chang	32,84%	6.73	0.89
Zhejiang	Individual - Indirect	Ningbo Meishan Bonded Port Area Xiaoyi Jizhi Investment Management Partnership 宁波梅山保税港区小壹极致投资管理合伙企业(有限合伙)	14,63%	3.00	0.40
Chongqing	Chongqing	Chongqing Liangjiang New Area Strategic Emerging Industry Equity Investment Fund Partnership 重庆两江新区战略性新兴产业股权投资基金合伙企业（有限合伙）	7,73%	1.59	0.21
Zhejiang	Zhejiang	Jiaxing Hagong Ruihanghao No. 7 Investment Partnership 嘉兴哈工瑞航柒号投资合伙企业(有限合伙)	5,71%	1.17	0.15
Tianjin	Tianjin	Tianjin CICC Jiatai Phase II Equity Investment Fund Partnership 中金佳泰贰期(天津)股权投资基金合伙企业(有限合伙)	3,82%	0.78	0.10

Chongqing	Chongqing	Chongqing Liangjiang Aerospace Industry Investment Group Co., Ltd. 重庆两江航空航天产业投资集团有限公司	3,45%	0.71	0.09
Guangdong	Guangdong	Shenzhen Qianhai Qianyi Zhihe 12th Investment Partnership 深圳市前海千意智合十二期投资合伙企业(有限合伙)	3,20%	0.66	0.09

Among the main investors of OneSpace, there is a direct investment by the founder as well as an indirect investment (Jiaxing Hagong Ruihanghao Investment Partnership), amounting to a total of 47.47% of the subscribed capital.

The third and sixth largest investors appear to be local guided funds from the Chongqing Liangjiang industrial zone.

Jiaxing Hagong Ruihanghao Investment Partnership is a local-level SOE registered in Jiaxing City, Zhejiang Province. The firm engages in equity and industrial investments, which align with local government efforts to support regional industries and promote innovation within specific provinces or cities.

Tianjin CICC Jia Tai II Equity Investment Fund Partnership is a private equity investment fund operating under China International Capital Corporation (CICC) Capital Operation Co., Ltd.. CICC is a publicly traded company controlled by a State-owned entity.

Shenzhen Qianhai Qianyi Zhihe Twelfth Phase Investment Partnership is a private equity fund, also holding a minority share in iSpace.

<u>iSpace</u>

Origin	**Nature**	**Name**	**% Total**	**Mio RMB**	**Mio EUR**
Jiangsu	Individual - Indirect	Lianyungang Weicong Enterprise Management Partnership 连云港	27,07%	100.73	13.27

		惟聪企业管理合伙企业（有限合伙）			
Beijing	Beijing	Beijing Juxin Jinxiang Enterprise Management Partnership 北京聚信锦翔企业管理合伙企业（有限合伙）	8,34%	31.03	4.09
Jiangsu	Individual - Indirect	Lianyungang Junde Enterprise Management Partnership 连云港俊德企业管理合伙企业（有限合伙）	8,33%	30.99	4.08
Jiangsu	Individual - Indirect	Lianyungang Shanyong Enterprise Management Partnership 连云港善用企业管理合伙企业（有限合伙）	6,25%	23.25	3.06
Individual	Individual - Other	Li Fan	5,16%	19.20	2.53
Zhejiang	Zhejiang	Hangzhou Chuangqian Investment Partnership 杭州创干投资合伙企业（有限合伙）	4,84%	17.99	2.37
Beijing	Beijing	Beijing Ruizhi Equity Investment Fund Partnership 北京瑞智股权投资基金(有限合伙)	4,69%	17.44	2.30
Hubei	Hubei	Tianfeng Ruili (Wuhan) Stock Investment Center 天风睿利（武汉）股投投资中心（有限合伙）	2,79%	10.38	1.37
Jiangsu	Jiangsu	Nanjing Iron & Steel Co., Ltd. 南京钢铁股份有限公司	2,64%	9.81	1.29

The shareholding structure of iSpace is quite dispersed, with the top nine investors collectively holding 70%. Among these are three indirect investments: Lianyungang Weicong Business Management Partnership - Limited Partnership, Lianyungang Junde Business Management

Partnership - Limited Partnership, and Lianyungang Shanyong Business Management Partnership - Limited Partnership.

One individual shareholder, Li Fan, holds 5,16% and is not listed as holding any senior position in iSpace on Tianyancha.

Additionally, there are four other entities identified as private, operating in the private capital markets: Beijing Juxin Jinxing Enterprise Management Partnership, Hangzhou Chuanggan Investment Partnership, Beijing Ruizhi Equity Investment Fund.

Tianfeng Ruili Wuhan Equity Investment Center is a private equity firm.

Nanjing Iron and Steel Co., Ltd., commonly known as NISCO, is a prominent Chinese steel manufacturer headquartered in Nanjing, Jiangsu Province. It is a publicly traded company listed on the Shanghai Stock Exchange and a subsidiary of CITIC Group, a state-owned enterprise.

Deep Blue Aerospace

Origin	Nature	Name	% Total	Mio RMB	Mio EUR
Individual	Individual - Direct	Huo Liang	25,58%	6.29	0.83
Zhejiang	Individual - Indirect	Ningbo Meishan Bonded Port Area Kejida Investment Management Partnership 宁波梅山保税港区科济达投资管理合伙企业(有限合伙)	20,16%	4.96	0.65
Jiangsu	Jiangsu	Jiangsu Jiequan Kaitong Intelligent Manufacturing Industry Investment Fund Partnership 江苏聿泉凯通智能制造产业投资基金(有限合伙)	11,14%	2.74	0.36
Zhejiang	Zhejiang	Hangzhou Shunying Equity Investment Partnership 杭州顺赢股权投资合伙企业(有限合伙)	6,62%	1.63	0.21

Jiangsu	Jiangsu	Nantong Jinjiu Huitong Phase V Venture Capital Fund Partnership 南通金玖惠通五期创业投资基金合伙企业(有限合伙)	6,33%	1.56	0.20
Shaanxi	Shaanxi	Tongchuan Aerospace Industry Development Fund Co., Ltd. 铜川市航天航空产业发展基金有限公司	5,87%	1.44	0.19

The two largest investors in Deep Blue Aerospace are its founder, Huo Liang, and an investment fund constitutive of indirect involvement by individuals within the company.

Jiangsu Jiequan Kaitong Intelligent Manufacturing Industry Investment Fund and Hangzhou Shunying Equity Investment Partnership are private equity funds.

Nantong Jinjiu Huitong Sixth Venture Capital Fund Partnership is a venture capital fund.

Tongchuan Aerospace Industry Development Fund Co., Ltd. is likely a local government-guided fund specializing in investments within the aerospace sector, aiming to support the growth of related businesses and contribute to the development of Tongchuan City's aerospace industry.

Galactic Energy

Origin	**Nature**	**Name**	**% Total**	**Mio RMB**	**Mio EUR**
Beijing	Individual - Indirect	Beijing Zhiyuan Exploration Management Consulting Center 北京至远探索管理咨询中心(有限合伙)	18,40%	4.40	0.58
Individual	Individual - Direct	Liu Baiqi	14,22%	3.40	0.45
Individual	Individual - Direct	Liu Jianshe	9,20%	2.20	0.29

Zhejiang	Zhejiang	Ningbo Huaqiang Ruizhe Investment Partnership 宁波华强睿哲投资合伙企业(有限合伙)	6,08%	1.45	0.19
Anhui	Anhui	Chizhou Jiangnan Industrial Concentration Zone Anfulan Industrial Investment Partnership (Limited Partnership) 池州江南产业集中区安芙兰产业投资合伙企业（有限合伙）	4,34%	1.04	0.14
Hunan	Hunan	Hunan Xiangjiang Yuanhang Private Equity Fund Enterprise 湖南湘江元航私募股权基金企业(有限合伙)	3,99%	0.95	0.13
Guangdong	Guangdong	Shenzhen Anfran Equity Investment Fund Partnership 深圳安芙兰股权投资基金合伙企业(有限合伙)	3,83%	0.92	0.12
Sichuan	Sichuan	Chengdu Chuanxingxingshu Venture Capital Center 成都川商兴蜀创业投资中心(有限合伙)	2,41%	0.58	0.08
Anhui	Anhui	Jingde Zhongan Green Health Industry Fund Partnership 旌德中安绿色健康产业基金合伙企业(有限合伙)	1,92%	0.46	0.06
Xinjiang	Xinjiang	Huoerguo Dingyue Kexin Equity Investment 霍尔果斯市鼎越科鑫股权投资有限合伙企业	1,92%	0.46	0.06
Zhejiang	Zhejiang	Zhuji Puhua Ansheng Equity Investment Partnership (Limited Partnership) 诸暨普华安盛股权投资合伙企业（有限合伙）诸暨普	1,85%	0.44	0.06

		华安盛股权投资合伙企业（有限合伙）			
Zhejiang	Zhejiang	Hangzhou New Potential Equity Investment Partnership (Limited Partnership)杭州新势能股权投资合伙企业(有限合伙)	1,80%	0.43	0.06

The shareholding structure of Galactic Energy is particularly dispersed compared to the companies studied, with the top 12 investors collectively holding barely 70% of the investment.

The top three investors, collectively holding 41.82% of the shares, include a fund controlled by the company's founders and executives, the Beijing Zhiyuan Exploration Management Consulting Center, as well as two members of the company directly holding shares, Liu Baiqi and Liu Jianshe.

There are seven entities identified as private, operating in the private capital markets.

Ningbo Huaqing Ruizhe Venture Capital Partnership (Limited Partnership), is a venture capital firm.

Hunan Xiangjiang Yuanhang Private Equity Fund Enterprise (Limited Partnership) is a private equity firm. Specializing in strategic investments in technology and aerospace sectors, it has also invested in Beijing Weina Xingkong Technology and Beijing Hangtian Yuxing Technology.

Shenzhen Anfu Lan Equity Investment Fund Partnership (Limited Partnership) is a private equity fund with a mixed ownership structure, focusing on equity investments in technology and biotech sectors.

Chengdu Chuanshang Xingshu Venture Capital Center (Limited Partnership) is a private venture capital firm. It focuses on venture capital investments, consulting, and management services for startups.

Khorgos Dingyue Kexin Equity Investment Limited Partnership is a private equity investment firm, focusing on equity investments in non-listed companies, acquiring shares of publicly

listed companies through private placements or equity transfers and providing related consulting services.

Zhuji Puhua Ansheng Equity Investment Partnership (Limited Partnership) is a private equity investment firm. It focuses on equity investments and venture capital, primarily targeting unlisted enterprises across various sectors including high technologies.

Hangzhou Xinshinen Equity Investment Partnership (Limited Partnership) is a private equity investment firm focusing on equity investments across various sectors including high technologies.

Two of the main shareholders are likely to be functioning as local guided funds:

Chizhou Jiangnan Industrial Concentration Zone Anfu Lan Industrial Investment Partnership (Limited Partnership) is a private equity and venture capital firm, plausibly functioning as a local government-guided fund.

Jingde Zhong'an Green Health Industry Fund Partnership (Limited Partnership) is a private equity fund with significant state-owned investment : 50% of it is held by the Jingde County State-owned Capital Investment Operation Holding Group Co., Ltd., and an additional 30% by Anhui High-Tech Industry Investment Co., Ltd. The fund focuses on venture capital and equity investments in various sectors including media, pharmaceuticals, genetic technologies and aerospace, also likely to act as a local government-guided fund.

Space Pioneer

Origin	Nature	Name	% Total	Mio RMB	Mio EUR
Individual	Individual - Direct	Kang Yonglai 康永来	30,24%	6.29	0.83
Tianjin	Individual - Indirect	Tianjin Tianbing Consulting Partnership 天津天兵咨询合伙企业（有限合伙）	9,62%	2.00	0.26
Jiangsu	Jiangsu	Zhangjiagang Ecological Science and Technology City Development	8,94%	1.86	0.24

		Co., Ltd. 张家港生态科技城发展有限公司			
Zhejiang	Zhejiang	Hangzhou Aoyou Tianji Venture Capital Partnership 杭州遨游天际创业投资合伙企业（有限合伙）	7,58%	1.58	0.21
Tianjin	Individual - Indirect	Tianjin Tianbing Technology Partnership 天津天兵科技合伙企业（有限合伙）	7,21%	1.50	0.20
Zhejiang	Zhejiang	Jiaxing Huanyou Xinghe Venture Capital Partnership 嘉兴寰游星河创业投资合伙企业（有限合伙）	4,50%	0.93	0.12
Guangdong	Guangdong	Shenzhen Guoke Ruihua Phase III Equity Investment Fund Partnership 深圳市国科瑞华三期股权投资基金合伙企业（有限合伙）	3,97%	0.83	0.11

The main investors in Space Pioneer's subscribed capital show an average level of concentration compared to the other companies studied, with seven shareholders collectively holding more than 70% of the shares.

Among them, three investors are connected to the company's founders and executives: Kang Yonglai holds the largest share with 30%, while two indirect investments by founders and executives via funds acting as special vehicles, Tianjin Tianbing Consulting Partnership (Limited Partnership) and Tianjin Tianbing Technology Partnership (Limited Partnership), hold 9.62% and 7.21% of the shares, respectively.

Hangzhou Aoyou Tianji Venture Capital Partnership (Limited Partnership) is a private venture capital firm focusing on equity investments.

Shenzhen Guoke Ruihua Phase III Equity Investment Fund Partnership (Limited Partnership) is a private equity investment fund focusing on venture capital and equity investments across various sectors. The partnership includes both private and state-owned entities, indicating a mixed ownership structure.

OrienSpace

Origin	Nature	Name	% Total	Mio RMB	Mio EUR
Zhejiang	Individual - Indirect	Ningbo Xinghe Jia Enterprise Management Partnership (Limited Partnership) 宁波星禾嘉企业管理合伙企业（有限合伙）	52,50%	18.31	2.41
Zhejiang	Individual - Indirect	Ningbo Yibai Jia Enterprise Management Partnership 宁波亿柏嘉企业管理合伙企业（有限合伙）	9,27%	3.23	0.43
Hainan	Hainan	Hainan Sanya Shenglong Equity Investment Fund Partnership 海南三亚晟珑股权投资基金合伙企业（有限合伙）	3,80%	1.33	0.18
Guangdong	Guangdong	Shenzhen Sequoia Hanchen Equity Investment Partnership 深圳市红杉瀚辰股权投资合伙企业（有限合伙）	3,02%	1.05	0.14

The investment in OrienSpace's subscribed capital has a concentrated structure, with the top four investors collectively holding more than 70% of the shares.

Among these, two investors are funds held by the company's founders and executives, classified as indirect investments: Ningbo Xinghejia Enterprise Management Partnership (Limited Partnership) and Ningbo Yibaijia Enterprise Management Partnership (Limited Partnership).

Hainan Sanya Shenglong Equity Investment Fund Partnership (Limited Partnership) is a private equity investment firm focusing on equity investments across various sectors

Shenzhen Sequoia Hanchen Equity Investment Partnership (Limited Partnership) is a private equity investment firm focusing on equity investments across various sectors, affiliated with Sequoia Capital China**.**

RocketPi

Origin	**Nature**	**Name**	**% Total**	**Mio RMB**	**Mio EUR**
Individual	Individual-Direct	Cheng Wei	53,85%	6.75	0.89
Tianjin	Individual-Indirect	Tianjin Denong Duoying Enterprise Management Consulting Partnership 天津德浓多赢企业管理咨询合伙企业（有限合伙）	13,82%	1.73	0.23
Shanghai	Shanghai	Shanghai Huo Lei Consulting Management Partnership (Limited Partnership) 上海火镭咨询管理合伙企业（有限合伙）	5,34%	0.67	0.09

The investment in RocketPi's capital is highly concentrated, with the top three investors holding over 70% of the shares.

Shanghai Huolei Consulting Management Partnership (Limited Partnership), is a private consulting firm.

Section conclusion

Thus, for private enterprises, we observe a certain diversity in investor profiles. While the majority of subscribed capital originates from founders, senior staff, and employees—either directly or indirectly through special-purpose vehicles and employee stock ownership plans (ESOPs)—a significant portion of external private capital is also present in some cases: 24.09%

for Deep Blue Aerospace, 21.88% for Galactic Energy, and 14.96% for iSpace. This proportion amounts to 7% for OrienSpace, 5% for RocketPi, and 4.5% for Space Pioneer.

State-owned enterprises (SOEs) are also represented among the shareholders, such as Xinjiang Goldwind, which holds 8.30% of LandSpace, Tongfang Investment with 8.16% of Space Trek, and NISCO with 2.64% of iSpace. Two investors of mixed ownership were identified: Tianjin CICC, which holds 3.42% of iSpace, and Ruihua, with 3.97% of Space Pioneer. Funds likely operating as local government-guided funds were found in the case of OneSpace in the Liangjiang area (11.18% in total), and Tongchuang Aerospace, which holds 5.87% of Deep Blue Aerospace.

The presence of guided funds is particularly noteworthy, as it illustrates one of the mechanisms through which local governments can support commercial space enterprises. As mentioned in the Introduction, a publicly available excerpt from a Euroconsult report indicated that the financing of China's commercial space sector is largely supported by local rather than central governments.

These findings significantly nuance some of the interpretations found in English-language literature introduced earlier, which tend to frame the rise of Chinese commercial space enterprises as the result of a carefully orchestrated master plan. On the contrary, the financing of private commercial space enterprises primarily relies on the founders' and employees' own capital, a large share of private equity, and sporadic public investments, which rarely overlap. As previously discussed, investor profiles vary widely, with a high degree of diversity among the main investors identified for a selected group of companies.

c. *Geographical Origin of Shareholders: a Concentrated but Diverse Investment Landscape*

2020 Sample

Origin	**Share of total**	**Number of investors**
Individual	24,98%	28
Jiangsu	19,12%	13
Beijing	12,31%	18
Zhejiang	11,49%	29
Guangdong	8,73%	22

Shanghai	6,09%	11
Xinjiang	4,10%	2
Jiangxi	3,94%	8
Shandong	2,00%	7
Hubei	1,14%	4
Tianjin	1,10%	4
Shaanxi	1,08%	3
Heilongjiang	0,78%	2
Sichuan	0,78%	7
Chongqing	0,74%	2
Fujian	0,55%	5
Hunan	0,45%	1
Tibet	0,25%	3
Anhui	0,23%	2
Guizhou	0,14%	1
Total général	100,00%	172

This table was compiled using the registered addresses of the shareholders of the companies studied in 2020, with particular attention to the province of registration and the number of shares held relative to the total subscribed capital. When the investor was a natural person, a separate category was created to indicate that the shareholder was an individual.

The first conclusion of this table is that natural person represented the largest group, concentrating almost a quarter of the investment but also the second largest number of investors within a category.

As observed in the previous subpart, not all investments are direct. Some founders and major stakeholders have invested through special-purpose vehicles rather than in their personal names. These indirect investments are reflected in the table under the corresponding provinces of registration rather than being categorized separately.

Second, as can be seen in the graph, the funds come from investors whose registration is based in a wide variety of regions. A significant amount of the funds come from investment funds based in Jiangsu, accounting for nearly 20% of the total. Beijing and Zhejiang, both around 12%, and Guangdong, circa 9%, also concentrate a large number of space investor headquarters, exceeding 20 investors.

The relevance of a geographic repartition for the headquarters of investor firms must be kept in perspective, since the place of the headquarter is not necessarily representative of the activity of the firm, given the fluidity of capital circulation. Alternative typology can be envisioned for later research, such as: size of the investor, specialized or not (space; technology; communication; tackling a particular region), corporate nature etc.

2023 Sample

Province	Sum of contributions Mio RMB	Sum of contributions Mio EUR	% of total	Investor Number
Jiangsu	218.19	28.71	35,14%	33
Individual	85.82	11.29	13,82%	35
Beijing	85.09	11.20	13,70%	24
Zhejiang	84.83	11.17	13,66%	57
Guangdong	22.43	2.95	3,61%	27
Jiangxi	19.89	2.62	3,20%	14
Hubei	19.83	2.61	3,19%	7
Shandong	17.75	2.34	2,86%	23
Shaanxi	14.64	1.93	2,36%	6
Tianjin	13.55	1.78	2,18%	12
Shanghai	11.18	1.47	1,80%	13
Xinjiang	8.76	1.15	1,41%	2
Fujian	3.81	0.50	0,61%	10
Hainan	3.42	0.45	0,55%	5
Sichuan	2.63	0.35	0,42%	7
Chongqing	2.56	0.34	0,41%	3
Tibet	2.16	0.28	0,35%	3
Hunan	1.83	0.24	0,29%	3
Anhui	1.50	0.20	0,24%	2
Henan	0.34	0.05	0,06%	1
Heilongjiang	0.30	0.04	0,05%	1
Guizhou	0.30	0.04	0,05%	1
Liaoning	0.14	0.02	0,02%	1

The data collected in 2023 allows us to categorize the various investors contributing to the subscribed capital of all enterprises based on their province of origin or natural person where applicable. We can observe a certain concentration among these investors, with more than 75% of the investment coming from four origins: in order of importance, Jiangsu (35.14%); individual investors, including founders and others (13.82%); Beijing (13.70%); and Zhejiang (13.66%). Investments from Guangdong, Jiangxi, and Hubei exceed 3%, amounting to approximately 20 million RMB.

Jiangsu is one of China's most developed provinces economically, with a strong manufacturing and technological base. The region is home to many high-tech industries, making it a hub for investors interested in aerospace and related technologies. High tech and innovation related industries also benefits a strong policy support in the region, that is close to Shanghai

Beijing is the center of aerospace governance, with proximity to key regulators and policy drivers. The city hosts an ecosystem of leading research institutions and SOEs in aerospace. This attracts investors and institutions aligned with national strategic priorities.

Zhejiang has a highly dynamic private sector, particularly active in new technologies and the digital economy. It is likely that the local financial sector is inclined to invest in high-tech emerging industries, even those considered high-risk.

It is interesting to examine the geographic distribution of these investors, which would constitute an avenue for further research. While we can propose rationales for the concentration of investors in certain regions, these do not necessarily explain the relatively low engagement of investors from other provinces with comparable strengths, such as Shanghai or Hubei.

Beijing and Zhejiang not only host a significant number of investors but are also favored locations for the establishment of wholly-owned subsidiaries, as explored further below.

Aside from these two cases, there is no clear correlation between the regions contributing investment funds to enterprise capital and the regions where companies establish their actual operations through subsidiaries. For instance, among the private enterprises studied, none have subsidiaries established in Jiangsu, Guangdong, Jiangxi, or Hubei.

On the other hand, certain provinces with a smaller percentage of total investment—such as Shandong and Shaanxi—are popular locations for the establishment of subsidiaries.

This discrepancy highlights a potential decoupling between investment origins and operational geography, suggesting that factors beyond regional investor presence, such as infrastructure, industry clustering, policy incentives and other political concerns may drive decisions on subsidiary locations.

2. *SOE Spin-Offs: Institutional Financing and National-Level Support*

a. *ExPace – Dominance of CASIC's Institutes*

2020 Shareholding Structure

The company ExPace was included in the 2020 sample, enabling a comparison across two points in time: September 2020 and May of 2023. As a spin-off from the main conglomerate CASIC, ExPace stood out among the selected commercial space launch enterprises, exhibiting several distinctive features.

First, ExPace's registered capital in September 2020 far exceeded that of private enterprises, standing at 700 million RMB (approximately 87.72 million EUR). By comparison, Landspace—the private company with the second-largest registered capital—had only 155.69 million RMB (19.51 million EUR), a ratio of roughly 4.5 to 1. The average registered capital of the seven private enterprises in the 2020 sample was 30.24 million RMB (3.79 million EUR), making ExPace's capital more than 23 times higher. The median registered capital was 18.75 million RMB (2.35 million EUR), resulting in an even more pronounced ratio of approximately 37 to 1.

Second, the distribution of ExPace's investment also differed significantly from private companies. China Sanjiang Space Group [中国航天三江集团公司 *zhongguo hangtian sanjiang jituan gongsi*], the fourth academy of CASIC, brought together 69.29% of the funds. There was no investment from physical persons belonging to the leadership either directly or through special vehicles.

Third, as we will see in the next subpart, ExPace had no subsidiaries in either 2020 or 2023, which is unique to all the companies studied.

Origin	**Nature**	**Name**	**% Total**	**Mio RMB**	**Mio EUR**
Hubei	CASIC China Aerospace Sanjiang Group Corporation CASIC 中国航天三江集团公司	69.29%	485.00	63.89	8.35
Hubei	Hubei Changjiang Aerospace Industry Investment Fund Partnership (Limited	8.57%	60.00	7.90	1.03

	Partnership) 湖北长江航天产业投资基金合伙企业(有限合伙)				
Zhejiang	Hangzhou Guoke Jinyan Investment Partnership (Limited Partnership) 杭州国核金研投资合伙企业(有限合伙)	5.71%	40.00	5.27	0.69
Guangdong	Shenzhen Zhongjun Leading Investment Partnership (Limited Partnership) 深圳市中军领航投资合伙企业(有限合伙)	4.29%	30.00	3.95	0.52
Beijing	CRRC Equity Investment Holdings Co., Ltd. 中车股权投资有限公司	2.86%	20.00	2.63	0.34
Zhejiang	Ningbo Meishan Free Trade Port Zhongjin Haotian Equity Investment Partnership (Limited Partnership) 宁波梅山保税港区中金澔天股权投资合伙企业(有限合伙)	2.14%	15.00	1.98	0.26
Guangdong	China State-Owned Capital Venture Investment Fund Co., Ltd. 中国国有资本风险投资基金股份有限公司	2.14%	15.00	1.98	0.26
Zhejiang	Hangzhou Zhemin Investment Aerospace Investment Partnership (Limited Partnership) 杭州浙民投航天投资合伙企业(有限合伙)	1.43%	10.00	1.32	0.17
Zhejiang	Shenzhen Innovation Investment Group Co., Ltd. 深圳市创新投资集团有限公司	1.43%	10.00	1.32	0.17
Hubei	Hubei Aerospace Technology Research Institute General Design Institute 湖北航天技术研究院总体设计所	1.07%	7.50	0.99	0.13
Hubei	Hubei Sanjiang Aerospace Jianghe Chemical Technology Co., Ltd. 湖北三江航天江河化工科技有限公司	1.07%	7.50	0.99	0.13

First, the investment structure was exceptionaly concentrated. Nearly 70% of the investment came from Sanjiang, the 4th Academy of CASIC and ExPace's parent company.

The second-largest investor was Hubei Changjiang Aerospace Industry Investment Fund Partnership, a large mixed ownership investment fund with a registered capital of 2.2 billion RMB (approximately 275.69 million EUR), in which CASIC holds a 9,09%. The fund focuses on non-securities equity investments and related consulting services, primarily in sectors such as commercial aerospace and military-civilian integration. The fund has several investments in the aerospace industry.

Among the minority investors, there were several funds with a visibly national scope, such as CRRC Equity Investment Holdings and China State-Owned Capital Venture Investment Fund Co. Ltd. There were also possible provincial funds, such as Shenzhen Innovation Investment Group.

Origin	% Total Capital	Shareholders numbers
Hubei	80,00%	4
Zhejiang	9,29%	3
Guangdong	7,86%	3
Beijing	2,86%	1

The Hubei province concentrated 80% of the investment. This includes four investors, notably the two mentioned above and two ultra-minor shareholders: the Hubei Aerospace Technology Research Institute General Design Institute and the Hubei Sanjiang Aerospace Jianghe Chemical Technology. These entities could be related research institutions or technical partners within ExPace's supply chain.

Other investors are located in Zhejiang and Guangdong provinces, which are known as hubs for both financial and high-tech industries and are commonly present in many enterprises' shareholdings structure.

2023 Shareholding Structure

Origin	Name	% Total	Mio RMB	Mio EUR
Hubei	CASIC China Aerospace Sanjiang Group Corporation CASIC 中国航天三江集团公司	56.43%	485.00	63.89
Hubei	Hubei Changjiang Aerospace Industry Investment Fund Partnership 湖北长江航天产业投资基金合伙企业(有限合伙)	6.98%	60.00	7.90
Zhejiang	Hangzhou Guohe Jinyan Investment Partnership (Limited Partnership) 杭州国核金研投资合伙企业(有限合伙)	4.65%	40.00	5.27
Beijing	National Military-Civil Fusion Industry Investment Fund Co., Ltd. 国家军民融合产业投资基金有限责任公司	3.49%	30.00	3.95
Guangdong	Shenzhen Zhongjun Leading Investment Partnership (Limited Partnership) 深圳市中军领航投资合伙企业(有限合伙)	3.49%	30.00	3.95
Shandong	Jinshi Aerospace (Zibo City) Equity Investment Partnership (Limited Partnership) 金石宇航(淄博市)股权投资合伙企业(有限合伙)	3.10%	26.62	3.51
Beijing	CRRC Equity Investment Holdings Co., Ltd. 中车股权投资控股有限公司	2.33%	20.00	2.63
Hubei	Chuanghe Aerospace (Hubei) Investment Partnership (Limited Partnership) 创合航创(湖北)投资合伙企业(有限合伙)	2.33%	20.00	2.63
Zhejiang	Hangzhou Jinyan Hangtian Equity Investment Partnership (Limited Partnership) 杭州金研航添股权投资合伙企业(有限合伙)	2.33%	20.00	2.63

Hunan	Hunan Hualing Dice Honggang Investment Partnership (Limited Partnership) 湖南华菱迪策鸿钢投资合伙企业(有限合伙)	2.33%	20.00	2.63
Zhejiang	Huzhou Shangdao Tianjian Equity Investment Partnership (Limited Partnership) 湖州尚道天箭股权投资合伙企业(有限合伙)	2.33%	20.00	2.63
Jiangsu	Suzhou Zhongjin SAIC Emerging Industry Equity Investment Fund Partnership (Limited Partnership) 苏州中金上汽新兴产业股权投资基金合伙企业(有限合伙)	2.33%	20.00	2.63
Guangdong	China State-Owned Capital Venture Investment Fund Co., Ltd. 中国国有资本风险投资基金股份有限公司	1.75%	15.00	1.98
Zhejiang	Ningbo Meishan Free Trade Port Zhongjin Haotian Equity Investment Partnership (Limited Partnership) 宁波梅山保税港区中金澔天股权投资合伙企业(有限合伙)	1.75%	15.00	1.98
Guangdong	Shenzhen Innovation Investment Group Co., Ltd. 深圳市创新投资集团有限公司	1.16%	10.00	1.32
Jiangxi	Gongqingcheng Mingfeng Tianxing Technology Industry Investment Partnership (Limited Partnership) 共青城鸣凤天行科技产业投资合伙企业(有限合伙)	1.09%	9.40	1.24
Hubei	Hubei Sanjiang Aerospace Jianghe Chemical Technology Co., Ltd. 湖北三江航天江河化工科技有限公司	1.09%	7.50	0.99
Hubei	Hubei Aerospace Technology Research Institute General Design Institute 湖北航天技术研究院总体设计所	0.87%	7.50	0.99

Zhejiang	Hangzhou Zhemin Investment Aerospace Investment Partnership (Limited Partnership) 杭州浙民投航天投资合伙企业（有限合伙）	0.39%	3.38	0.45

Three years later, the structure of the subscribed capital underwent several changes. For the company ExPace, I chose to present the full list of investors, beyond the main ones, in order to highlight the evolution of its shareholding structure between 2020 and 2023, and to enable comparison with CLMR.

The subscribed capital for ExPace increased from 700 million RMB (approximately 87.72 million EUR in September 2020) to 859.4 million RMB (approximately 113.08 million EUR in May 2023). This represents a capital increase of 159.4 million RMB (approximately 20.97 million EUR) since 2020. The absolute value of the shares held has not changed compared to 2020. Although a large majority of the shares are still held by Sanjiang, there has been a dilution of its assets due to the entry of new investors, which increased from 11 to 19.

CASIC (China Aerospace Sanjiang Group Co., Ltd.) remains the dominant shareholder, holding 56.43% of the capital (485 Mio RMB), while Hubei Changjiang Aerospace Industry Investment Fund maintains a stake of 6.98% (60 Mio RMB).

Other notable investors with moderate stakes remain Hangzhou Guohe Jinyan Investment Partnership (4.65%) and Shenzhen Zhongjun Leading Investment Partnership (3.49%). Hangzhou Guohe Jinyan Investment Partnership (Limited Partnership), which is a state-owned private equity investment firm affiliated with China National Nuclear Corporation (CNNC).

National Military-Civil Fusion Industry Investment Fund (3.49%) appears as a new moderate investor. It is a state-owned fund established with a registered capital of 51 billion RMB. It aims to promote the deep integration of military and civilian industries, support technological innovation, and facilitate the commercialization of military technologies. This fund is also a shareholder in China Long March Rocket.

A key difference between the 2020 and 2023 data is the emergence of what seems to be government-guided investment funds among ExPace’s shareholders, a category that was absent

in the 2020 data. This could be an example of *mixed-ownership reform* advocated by Liu Yufei in Chapter II.[371]

Origin	% Total Capital	Shareholders numbers
Hubei	67,49%	5
Zhejiang	11,45%	5
Guangdong	6,40%	3
Beijing	5,82%	2
Shandong	3,10 %	1
Jiangsu	2,33%	1
Hunan	2,33%	1
Jiangxi	1,09%	1

A certain diversification occurred in the geographical repartition of shareholders of ExPace between 2020 and 2023, inserting minor shares from Shandong (3,06%); Jiangsu (2,30%); Hunan (2.30%); and Jiangxi (1.08%). Six regional investment partnerships and funds from cities like Beijing, Shenzhen, Hangzhou, and Changsha hold stakes 2.33% each (20 000 kRMB).

a. *China Long March Rocket: Dominance of CASC's Institutes and National Guided Funds*

Origin	Name	% Total	Mio RMB	Mio EUR
Not indicated	China Academy of Launch Vehicle Technology 中国运载火箭技术研究院	35.89%	78.84	10.38
Beijing	Beijing Aerospace Automation Control Institute 北京航天自动控制研究所	16.39%	36.00	4.74
Beijing	Beijing Aerospace Long March Vehicle Research Institute 北京航天长征飞行器研究所	16.39%	36.00	4.74
Beijing	Beijing Aerospace Systems Engineering Institute 北京宇航系统工程研究所	13.27%	29.16	3.84

[371] Liu, "Mixed Reform, A Window for Commercial Space and Space Commercialization [hungai, wei shangye hangtian yu hangtian shangyehua dakaile de yi chuanghu] 混改,为商业航天与航天商业化打开的一扇窗."

Not indicated	Aerospace Investment Holdings Co., Ltd. 航天投资控股有限公司	5.78%	12.70	1.67
Not indicated	National Military-Civil Fusion Industry Investment Fund 国家军民融合业投资基金有限责任公司	5.78%	12.70	1.67
Not indicated	Guohua Military-Civil Fusion Industry Development Fund 国华军民融合产业发展基金（有限合伙）	3.61%	7.94	1.05
Not indicated	Guochuang Investment Guidance Fund 国创投资引导基金（有限合伙）	2.89%	6.35	0.84

The subscribed capital structure of China Long March Rocket, as collected in the May 2023, is particularly concentrated, with 81.94% of the capital held by four institutes of CASC. This situation is unique, as is the territorial distribution, which is exclusively focused on Beijing.

CASC core research institutes dominate the investment, with China Academy of Launch Vehicle Technology (CALT) at 35.89%; followed by Beijing Aerospace Automation Control Institute 16.39%; Beijing Aerospace Long March Vehicle Research Institute 16.39% and Beijing Aerospace Systems Engineering Institute 13.27%. This concentration highlights CASC's predominant role in shaping the technical direction and development of the newly established China Long March Rocket.

The remaining 18.06% of shares are held by minority investors, seemingly national level specialized investment funds for space; civil military integration and innovation. One of them, National Military-Civil Fusion Industry Investment Fund, is also present in the shareholding of ExPace. The access to financing via these types of funds could be of strategic importance in the establishment of commercial space launch enterprises subsidiaries to State-owned companies.

On the territorial repartition front, China Long March Rocket presents a unique situation where all investors are based in Beijing.

Section conclusion

The defining characteristics of the subscribed capital investment in the SOE subsidiaries studied are, first and foremost, the substantial amounts of subscribed capital, which are comparable to or even exceed those of the most advanced private enterprises. Secondly, the shareholding structure of these subsidiaries prominently features institutes and laboratories affiliated with the parent SOEs, which collectively account for the majority of the investment. Secondly, their shareholding structure is marked by the prominent presence of institutes and laboratories affiliated with the parent SOEs, which together account for the majority of the investment. Finally, there is the potential involvement of nationally guided funds in their capital structure—something that was not identified among the main shareholders of the other enterprises studied, where only local guided funds could be indentified or hinted at.

ExPace experienced significant diversification in its minority investors between 2020 and 2023. It is possible that this shift reflects a "mixed-ownership reform", particularly with the apparition of local government-guided investment funds. These funds are common investors in both *minying* enterprises and SOE spin-offs. However, state-owned enterprises appear to have access to funding sources that remain closed to *minying* enterprises for the time being, notably national-level guided funds such as the National Military-Civil Fusion Industry Investment Fund.

This could highlight the unique advantages SOE subsidiaries enjoy, such as access to significant institutional support positioning them differently within the competitive landscape of China's commercial space sector.

3. *CAS Space: CAS Funds, Limited Private Involvement*

In terms of subscribed capital, CAS Space falls slightly above the majority of private companies, with an amount of 42 million RMB (approximately 5.53 million EUR).

Origin	Name	% Total	Mio RMB	Mio EUR
Beijing	Beijing Pengyi Junlian Space Technology Center (Limited Partnership) 北京鹏毅君联空间技术中心（有限合伙）	30.72%	13.00	1.71
Beijing	Beijing CAS Lisen Technology Co., Ltd. 北京中科力森科技有限公司	29.64%	12.54	1.65
Beijing	Beijing Guoke Aerospace Technology Center (Limited Partnership) 北京国科宇航科技中心（有限合伙）	14.18%	6.00	0.79
Jiaxing	Jiaxing Minxin Equity Investment Partnership (Limited Partnership) 嘉兴敏新股权投资合伙企业（有限合伙）	2.50%	1.06	0.14

The investment structure of CAS Space is characterized by a certain concentration of the capital among three major investors who collectively hold nearly three-quarters of the shares (74.54%). Beijing Pengyi Junlian Space Technology Center and Beijing CAS Lisen Technology. own approximately 30.7% and 29.6% of the shares, respectively, while Beijing Guoke Yuhang Technology Center holds 14.18%.

Additionally, nine other investors each hold between 1% and 2.5% of the shares, while more than 25 investors maintain stakes below 1%.

The first and third investors, holding respectively 30.72% and 14.18% of the shares, appears to be investment entities associated only with CAS Space to this date, CAS also acting as their legal representative.

The second investor, Beijing CAS Lisen Technology, is a subsidiary of the Institute of Mechanics of CAS, endowed with managing the institute's assets and investments highlighting the company's classification as a mixed-ownership enterprise. Several other funds are visibly

CAS-related such as Beijing Phase II CAS Star Hard Technology Venture Investment Partnership or CAS Linkage Innovation Equity Investment Fund (Shaoxing) Partnership

Origin	% Total Capital	Shareholders numbers
Beijing	77,20%	7
Zhejiang	7,39%	8
Guangdong	4,46%	5
Tianjin	3,52%	3
Fujian	2,11%	4
Hunan	1,82%	2
Jiangsu	1,56%	3
Shanghai	0,80%	1
Anhui	0,42%	1
Chongqing	0,32%	1
Shandong	0,30%	1
Shaanxi	0,10%	1

In terms of geographical distribution, shareholders registered in Beijing dominate with an absolute majority, accounting for 77.20% of the total investment, while other provinces contribute only a small fraction. Guangdong ranks third with 4.46%, despite other data sources, such as WeChat communications, indicating a strong connection to this region. Zhejiang comes second with 7%, and Tianjin follows with 3.52%.

This plethora of minority shareholders in provinces outside Beijing (30), notably in Zhejiang, Tianjin, Hunan, and Chongqing could reflect a strategy of CAS to engage with high-tech zones and emerging industrial areas.

Section conclusion

As we observed in this chapter, the shareholding structures of the commercial space launch companies studied differ significantly depending on the type of enterprise. Private companies are primarily funded by their founders and employees—a distinctive feature not found in either State-owned enterprise (SOE) spin-offs or in the case of CAS Space. A closer examination of the main investors reveals the presence of private capital, as well as SOEs and local government-guided funds. The SOE spin-offs, ExPace and CLMR, are chiefly financed by the laboratories of their parent companies—CASIC and CASC, respectively. Among their

minority investors, central-level government-guided funds can also be identified. In the case of CAS Space, investment entities affiliated solely with CAS hold the majority of shares, whith a minority coming from private investment.

C. Subsidiaries Repartition: Beijing Leads, Shandong, Shaanxi, Zhejiang Follow

This section focuses on active wholly owned subsidiaries[372] of the 13 commercial space enterprises studied, allowing us to gain insights into the geographical distribution of the commercial launch sector in China.

1. Private Enterprises

Region	**Sum of share value kRMB**	**Sum of share value %**	**Subsidiaries Numbers**
Beijing	2179600	55,81%	18
Shaanxi	330000	8,45%	6
Shandong	520300	13,32%	4
Hainan	101000	2,59%	3
Zhejiang	228000	5,84%	3
Sichuan	10500	0,27%	2
Anhui	110000	2,82%	2
Shanghai	100000	2,56%	1
Chongqing	300000	7,68%	1
Hunan	18000	0,46%	1
Hebei	6000	0,15%	1
Jiangsu	2000	0,05%	1
Total	3905400	100,00%	43

It can be observed that, while the establishment of wholly owned subsidiaries demonstrates a certain diversity, spanning across 12 provinces, a relative concentration of these investments in specific regions possibly reveals strategic or structural patterns.

For instance, the Beijing region appears to be an essential hub for the establishment of these ten enterprises, half of which have their headquarters there: LinkSpace, Landspace, Space Trek, iSpace, Deep Blue Aerospace, and Galactic Energy. With the exception of Space Trek, all these companies also have a second wholly owned subsidiary in Beijing. Additionally, companies

[372] Other (closed) subsidiaries were mentioned in some instance. For improved clarity, I did only take into account the subsidiaries that were marked as active respectively on Aiqicha and Tianyancha during the first and the second study period. Also, investments in other enterprises that were not wholly owned subsidiaries are mentioned, but not included in the synthetic tables.

headquartered in other regions all have a presence in Beijing: OneSpace, OrienSpace, Space Pioneer and RocketPi.

Beijing offers numerous advantages that explain its popularity: proximity to government and regulatory bodies as well as established industry players in the space industry; access to a highly skilled talent pool stemming from top-tier universities; and its status as a high-tech financial hub.

Shaanxi province ranks second in concentrating the largest number of wholly owned subsidiaries among the private enterprises studied. Landspace, Deep Blue Aerospace, Galactic Energy, OneSpace, and OrienSpace all have facilities in this region. Shaanxi, particularly Xi'an, is a historical aerospace and defense hub. It hosts key research institutions and specialized universities, such as Northwestern Polytechnical University, which focus on aerospace engineering and related fields, making recruitment highly attractive. Additionally, state-owned enterprises (SOEs) like CASC and CASIC, with their extensive aerospace infrastructure, further enhance the region's appeal.

Shandong hosts four wholly owned subsidiaries from the studied enterprises (Deep Blue Aerospace, OrienSpace, Space Trek, and RocketPi), representing 13.32% of the total capital invested in subsidiaries. Alongside significant port infrastructure that enables the easy transportation of large rocket components, the region features a sea-based spaceport located in Haiyang (Oriental Space Port, OST). Shandong also has historical ties to China's industrial sector, boasting a strong manufacturing base and rising tech infrastructure, particularly technology parks.

Hainan hosts three wholly owned subsidiaries among the enterprises studied: Deep Blue Aerospace, iSpace, and OrienSpace. The region has recently completed the construction of a commercial spaceport[373]. Ports in Hainan, such as Haikou and Yangpu, provide logistical

[373] Blaine Curcio, "China's New Commercial Launch Site - Something Big Is Brewing Down in Hainan," *SpaceRef* (blog), June 5, 2023, https://spaceref.com/space-commerce/chinas-new-commercial-launch-site-something-big-is-brewing-down-in-hainan/.Andrew Jones, "China's Wenchang Aims to Become Commercial Space Hub," *SpaceNews* (blog), April 28, 2022, https://spacenews.com/chinas-wenchang-aims-to-become-commercial-space-hub/.Andrew Jones, "China Completes New Commercial Launch Pad to Boost Access to Space," SpaceNews, January 5, 2024, https://spacenews.com/china-completes-new-commercial-launch-pad-to-boost-access-to-space/.

support for transporting rocket components and infrastructure. Commercial space activities are also a key focus of the province's proactive development policies[374]

Finally, Zhejiang also hosts three facilities, two belonging to LandSpace and one to Galactic Energy, representing 5.84% of the total capital invested. Although traditionally less involved in space activities, the region has a base in advanced manufacturing and high-tech industries. Zhejiang also benefits from a strong entrepreneurship culture and venture capital ecosystem. Its highly developed transportation infrastructure, including ports and proximity to major industrial regions, facilitates the assembly and transport of rockets and components.

It is likely that enterprises aim to tap into region-specific resources such as specialized industries, infrastructure or logistical advantages, and talent pools. This is visible in the case of OrienSpace in Shandong, which has developed close ties with the prefecture-level city of Yantai. Here, the most obvious objective is access to the Oriental Space Port (OST, a focal point of OrienSpace's well-defined business strategy: conducting sea launches with a powerful solid rocket, both as a means of differentiation and to attract more investors.

In other cases, where regions host only one or two facilities, the investment could be more speculative, reflecting local governments' efforts to attract commercial space enterprises so as to establish new dedicated development zones. These efforts often involve favorable regional policies aimed at fostering innovation and economic development, such as advantageous tax conditions.

For companies, this may allow to access different market environments, aligning with diversification strategies, and maintaining a presence on multiple fronts. Establishing operations in less developed provinces could provide cost advantages, benefit from government incentives, and facilitate partnerships with local authorities. Such investments could also stem from privileged relationships between enterprises and provincial governments eager to develop

[374] "Hainan Sets Eyes on Deep Sea and Aerospace Innovation," Hainan government website, accessed April 6, 2025, http://www.ehainan.gov.cn/2024-01/26/c_959019.htm. "Wenchang International Aerospace City: New-Generation Launch Vehicle Assembly and Testing Facilities Are Being Rapidly Built [文昌国际航天城：新一代运载火箭总装测试厂房等正加快建设 Wenchang Guoji Hangtiancheng Xin Yidai Yunzai Huojian Zongzhuang Ceshi Changfang Deng Zheng Jiakuai Jianshe]," ScienceNet, accessed April 6, 2025, https://news.sciencenet.cn/htmlnews/2022/4/477674.shtm.FutureSpace, "政策文件 | 关于公开征求对《海南自由贸易港鼓励类产业目录（修订征求意见稿）》意见的公告," WeChat, accessed March 28, 2025, https://mp.weixin.qq.com/s/AiVCYCiTy4CL6RCE9aVlIg.

the space sector. Finally, a more diversified territorial footprint may also mitigate risks, protecting enterprises from regional economic fluctuations.

As central government support for the commercial space sector strengthens, local governments are increasingly implementing policies to encourage innovation and investment, broadening the scope of provinces eligible for this "prospective" kind of investment.

As seen in Chapter III, the administrative level is endowed with a certain degree of freedom in areas that are important for the registration address choice of companies: regulatory framework, taxation, specific subsidies etc. Local governments can also make specific deals with companies in particular: loan or donation of premises on preferential terms, granting of bank loans, subsidies, etc. The evidence of such transactions can be found in the database data: for example, the presence of OneSpace's headquarters in Chongqing. An agreement was struck between the space manufacturing enterprise and the autonomous municipality for the implantation within the development and innovation zone dedicated to aerospace, Liangjiang[375]. Onespace also holds 50,1% in a joint venture with Chongqing Liangjiang Aviation Industry Investment Group Co.

LinkSpace

At the time of the second round of data collection in May 2023, all previously identified subsidiaries of LinkSpace were found to have ceased operations. This situation highlights challenges faced by the company, which were described in interviews as stemming from difficulties in securing clients.

Landspace

Name	Location	Creation	Capital Mio RMB	Capital Mio EUR

[375] Andrew Jones, "Shanghai Signs Agreement with China's Megaconstellation Group, Aims to Foster Commercial Space Hub," *SpaceNews* (blog), February 17, 2022, https://spacenews.com/shanghai-signs-agreement-with-chinas-megaconstellation-group-aims-to-foster-commercial-space-hub/.Andrew Jones, "Shanghai Aims to Become Production Hub for Space Technology by 2025," *Reuters*, February 16, 2022, sec. Science, https://www.reuters.com/lifestyle/science/shanghai-aims-become-production-hub-space-technology-by-2025-2022-02-16/.

Landspace Shenyan Technology (Shanghai) Co., Ltd. 蓝箭申研航天科技（上海）有限公司	Shanghai	2023/04/05	100.00	26.06
Landspace Technology Co., Ltd. 蓝箭航天技术有限公司	Zhejiang	2018/03/13	198.00	1.32
Landspace Technology Industrial Development (Beijing) Co., Ltd. 蓝箭航天科技产业发展（北京）有限责任公司	Beijing	2020/11/19	10.00	2.63
Shaanxi Landspace Technology Co., Ltd. 陕西蓝箭航天技术有限公司	Shaanxi	2016/03/30	20.00	1.32
Zhejiang Landspace Space Technology Co., Ltd. 浙江蓝箭航天空间科技有限公司	Zhejiang	2016/11/07	10.00	13.17

One of the oldest private commercial launch companies, LandSpace oversees five subsidiary companies, whose territorial distribution is quite distinctive.

The most heavily financed hub, with a subscribed capital of 198 million RMB (approximately 26 million EUR), is located in Huzhou, Zhejiang Province. Another, smaller satellite entity 10 million RMB (1.32 million EUR) is based in Jiaxing, also in Zhejiang.

A significant hub, with a capital of 100 million RMB (1.32 million EUR), has been established in Shanghai—an unusual case among launch companies analyzed in our study periods. As noted in the previous subsection on company financing, Shanghai has been surprisingly absent both in the funding and in the early territorial presence of launch companies, despite its advanced technology infrastructure and industrial base.

In a 2023 field interview, the recent establishment of this wholly owned subsidiary in Shanghai was described as a strategic move aimed at aligning with the development of the Qianfan constellation[376]. Following the company's first launches in 2024, it is possible that such

[376] Andrew Jones, "Shanghai to Foster Commercial Space Ecosystem," SpaceNews, November 30, 2023, https://spacenews.com/shanghai-to-foster-commercial-space-ecosystem/.

initiatives, designed to bring companies closer to potential clients, will become more common, especially in a context where Shanghai municipalty is developing a voluntary policy aimed at the development of commercial space[377].

Other smaller hubs are located in Shaanxi (20 million RMB, 2.63 million EUR) and Beijing (10 million RMB, 1.32 million EUR).

Compared to other companies, LandSpace's territorial presence is less centralized around Beijing and more focused on its presumably long-standing presence in Zhejiang, with a more recent pivot toward Shanghai.

Space Trek

Name	Location	Creation	Capital Mio RMB	Capital Mio EUR
Shandong Space Trek Exploration Technology Co., Ltd. 山东星途探索科技有限公司	Shandong	2017/01/03	0.30	0.04
Chengdu Sai'er Space Technology Co., Ltd. 成都赛尔空间科技有限责任公司	Sichuan	2019/01/02	0.50	0.07
Mianyang Space Trek Exploration Technology Co., Ltd. 绵阳星途探索科技有限公司	Sichuan	2014/11/18	10.00	1.32

Space Trek is relatively modest in scale compared to the companies in the 2020 sample. However, it has expanded its territorial network between the two data collection periods. The organization of its subsidiaries focuses on western China and less central areas, such as Weifang in Shandong (300 kRMB, 39.47 kEUR); Chengdu (500 kRMB, 65.79 kEUR) and Mianyang in Sichuan (10 million RMB, 1.32 million EUR).

This focus may suggest a strategy to leverage lower-cost regions that provide access to manufacturing capabilities and local government support for industrial development. For a

[377] https://spacenews.com/shanghai-to-foster-commercial-space-ecosystem/

smaller space company with less funding than larger players, this could represent a deliberate cost-saving approach.

OneSpace

Name	Location	Creation	Capital Mio RMB	Capital Mio EUR
Beijing OneSpace Electronics Co., Ltd. 北京零壹空间电子有限公司	Beijing	2017/12/24	5.00	0.66
Beijing OneSpace Electronics Co., Ltd. 北京零壹空间电子有限公司	Chongqing	2012/12/11	300.00	39.51
Beijing XiaoYi Smart Technology Co., Ltd 北京小壹机智科技有限公司	Beijing	2020/06/21	30.00	3.95
Beijing OneSpace Technology Research Institute Co., Ltd. 北京零壹空间技术研究院有限公司	Beijing	2019/01/28	10.00	1.32
Xi'an OneSpace Technology Co., Ltd. 西安零壹空间科技有限公司	Shaanxi	2016/07/07	100.00	13.17

Seen as an ambitious player in the early days of the emergence of private commercial space launch companies, OneSpace has since stagnated. Few differences are evident between the data collected in 2020 and that of 2023, which contrasts with most other companies in the 2020 sample, for which we can witness important changes.

The main hub of the company, which also serves as its headquarters, is located in Chongqing, with a capital investment of 300 million RMB (approximately 39.5 million EUR). The company's establishment in Chongqing appears to be the result of privileged relations with the locality, particularly with the Liangjiang New Area, which lent its name to the company's first launch[378]. While the area provides industrial infrastructure, cost advantages, and logistical support, it is not traditionally a space industry hub nor a preferred destination for other companies. However, it likely offers lower operational costs compared to coastal cities, making

[378] Yingzi Tan, "OneSpace Set to Launch Nation's First Private Carrier Rocket," accessed April 6, 2025, https://global.chinadaily.com.cn/a/201805/08/WS5af15f97a3105cdcf651cab9.html.

it a strong location for production and large-scale operations. This situation could be constitutive of a form of local protectionnism.

Another significant hub is located in Xi'an, with a capital of 100 million RMB (13.2 million EUR).

Additionally, three wholly owned subsidiaries are present in Beijing, with capital investments of 30 million RMB (3,95 million EUR), 10 million RMB (1,32 million EUR), and 5 million RMB (660 kEUR).

In the case of OneSpace, the territorial strategy is primarily based on a strong investment in Chongqing, likely as its primary manufacturing and operational base, followed by a secondary focus on Xi'an, and smaller-scale hubs in Beijing.

iSpace

Name	Location	Creation	Capital Mio RMB	Capital Mio EUR
Beijing Interstellar Mission Space Technology Co., Ltd. 北京星际使命空间科技有限公司	Beijing	2018/04/10	1.00	0.13
Beijing Interstellar Propulsion Technology Co., Ltd. 北京星际推进科技有限公司	Beijing	2018/07/10	50.00	6.59
Beijing Interstellar Intelligent Space Technology Co., Ltd. 北京星际智联空间科技有限公司	Beijing	2018/03/11	1.00	0.13
Beijing Interstellar Intelligent Manufacturing Technology Co., Ltd. 北京星际智造科技有限公司	Beijing	2019/09/01	90.00	11.85
Beijing Interstellar Glory Technology Co., Ltd. 北京星际荣耀科技有限责任公司	Beijing	2014/07/15	260.00	34.24

Beijing Interstellar Glory Aerospace Industry Technology Co., Ltd. 北京星际荣耀航天产业科技有限公司	Beijing	2018/10/21	2.60	0.34
Beijing Interstellar Defense Technology Co., Ltd. 北京星际防务科技有限公司 我要认领 分享 关注	Beijing	2012/04/17	50.00	6.59
Hebei Interstellar Glory Aerospace Power Test Technology Co., Ltd. 河北星际荣耀航天动力试验技术有限责任公司	Hebei	2018/02/06	6.00	0.79
Hainan Interstellar Glory Aerospace Launch Technology Co., Ltd. 海南星际荣耀航天发射技术有限责任公司	Hainan	2018/09/20	50.00	6.59
Shaanxi Interstellar Glory Space Technology Co., Ltd. 陕西星际荣耀空间科技有限责任公司	Shaanxi	2007/10/07	50.00	6.59

iSpace, one of the most established and well-funded private companies, operates an extensive network of ten wholly owned subsidiaries. Among these, one subsidiary is particularly well-funded in Beijing, with a capital of 260 million RMB (34.2 million EUR), presumably one of the older entities. Another subsidiary in Beijing has a subscribed capital of 90 million (11.8 million EUR) RMB.

Four subsidiaries are funded at 50 million RMB each (6.6 million EUR), including two more in Beijing, one in Shaanxi, and one in Hainan.

Three smaller subsidiaries are located in Beijing, along with one in Hebei.

Thus, iSpace's operations are heavily concentrated in Beijing, where seven subsidiaries are based, while also showing some diversification toward identified hubs. The investment in Hebei, although smaller and more unique, may suggest a specific partnership or advantageous local policies. Notably, Qian'an, located in Hebei, is close to Beijing but likely offers lower operational costs, making it suitable for test facilities or support operations.

Deep Blue Aerospace

Name	Location	Creation	Capital Mio RMB	Capital Mio EUR
Tongchuan DeepBlue Aerospace Technology Co., Ltd. 铜川深蓝航天科技有限公司	Shaanxi	2019/10/27	10.00	1.32
Beijing DeepBlue Intelligent Aviation Technology Co., Ltd. 北京深蓝智航科技有限公司	Beijing	2018/12/20	10.00	1.32
Beijing DeepBlue Aerospace Industry Co., Ltd. 北京深蓝航天工业有限公司	Beijing	2020/03/23	10.00	1.32
Nantong DeepBlue Aerospace Technology Co., Ltd. 南通深蓝航天科技有限公司	Jiangsu	2022/11/14	2.00	0.26
DeepBlue Aerospace Spaceport (Hainan) Co., Ltd. 深蓝航天太空港（海南）有限公司	Hainan	2019/05/19	1.00	0.13
DeepBlue Aerospace Technology (Shandong) Co., Ltd. 深蓝航天科技（山东）有限公司	Anhui	2023/08/29	10.00	1.32
DeepBlue Aerospace Technology (Shandong) Co., Ltd. 深蓝航天科技（山东）有限公司	Shandong	2022/12/01	10.00	1.32

Deep Blue Aerospace's wholly owned subsidiaries are seven in 2023. Five of these have similar capital investments of 10 million RMB each (1.32 million EUR). They are located in Beijing (two), Shandong, Shaanxi, and Anhui. The Anhui location likely benefits from favorable investment policies.

Two smaller sites are located in Jiangsu (Tongchuan) and Hainan. Tongchuan is near Xi'an, a well-established aerospace and defense hub, while Wenchang in Hainan offers strategic value

for companies seeking proximity to a major launch site. The presence in Shaanxi (Tongchuan) and Hainan (Wenchang) indicates an intention to capitalize on regional aerospace development.

Galactic Energy

Name	Location	Creation	Capital Mio RMB	Capital Mio EUR
Beijing Galactic Energy Equipment Technology Co., Ltd. 北京星河动力装备科技有限公司	Beijing	2013/10/15	100.00	13.17
Anhui Galactic Energy Equipment Technology Co., Ltd. 安徽星河动力装备科技有限公司	Anhui	2019/10/07	100.00	13.17
Shaanxi Galactic Energy Space Technology Co., Ltd. 陕西星河动力空间科技有限公司	Shaanxi	2019/09/08	100.00	13.17
Beijing Galactic Energy Aerospace Technology Co., Ltd. 北京星河动力航天科技有限公司	Beijing	2020/05/12	20.00	2.63
Zhejiang Galactic Energy Space Technology Co., Ltd. 浙江星河动力空间科技有限公司	Zhejiang	2019/10/16	20.00	2.63
Changsha Galactic Energy Space Technology Co., Ltd. 长沙星河动力空间科技有限公司	Hunan	2018/07/08	18.00	2.37

Galactic Energy also operates six wholly owned subsidiaries. Three of these are significant, with a capital of 100 million RMB each (13,2 million EUR). One such hub is based in Beijing[379],

[379] The presence of entities with earlier founding dates than the parent company likely indicates the use of pre-existing corporate "shells" whose activities shifted after integration into the company. These data points can be volatile, and the founding date does not necessarily align with the commencement of manufacturing or R&D activities related to the company's launch vehicles.

likely serving as the main headquarters, alongside two additional poles: one in Anhui and another in Xi'an.

Three mid-sized hubs, each with around 20 million RMB (2,63 million EUR) in capital, are located in Beijing, Zhejiang, and Hunan. The Zhejiang and Hunan hubs are associated with manufacturing activities, which could indicate integration into local industrial ecosystems.

Space Pioneer

Name	Location	Creation	Capital Mio RMB	Capital Mio EUR
Beijing Tianbing Technology Co., Ltd. 北京天兵科技有限公司	Beijing	14/06/2015	150.00	19.76
Suzhou Tianbing Technology Co., Ltd. 苏州天兵科技有限公司	Jiangsu	26/10/2017	100.00	13.17

The company Space Pioneer has a unique organizational structure for its wholly owned subsidiaries. In addition to two subsidiaries owned directly by the parent company, three wholly owned subsidiaries originate from the Beijing hub (and are not directly linked to the parent company). Additionally, there are two entities in which Space Pioneer holds a 99% stake.

The parent company's two subsidiaries were established between 2015 and 2017 in Beijing and Suzhou, Jiangsu Province. They have respective capital investments of 150 million RMB (19,7 million EUR) and 100 million RMB (13,2 million EUR). The significant capital allocated —noting that the subscribed capital of the parent company, also based in Jiangsu, is only 20.8 million RMB— suggests that these subsidiaries serve as major industrial bases focused on high-value R&D, manufacturing, or technological development activities.

The choice of Beijing and Jiangsu for these subsidiaries could highlight a dual strategic focus. Beijing could serve as a hub for technology development, innovation, and access to governmental resources, while Jiangsu offers cost-effective manufacturing and a supportive industrial ecosystem. This geographic split may enable the company to balance innovation with scalable production capabilities, leveraging the advantages of each location. Beijing may focus on R&D and strategic planning, and Jiangsu could serve as a center for manufacturing or large-scale operations.

Name	Location	Creation	Capital Mio RMB	Capital Mio EUR
Suzhou Space Pioneer Technology Co., Ltd. 苏州天兵科技有限公司	Jiangsu	26/10/2017	100.00	13.17
Tianjin Space Pioneer Space Technology Co., Ltd. 天津天兵空间科技有限公司	Tianjin	26/12/2021	10.00	1.32
Gongyi Space Pioneer Technology Co., Ltd. 巩义市天兵航天科技有限公司	Henan	27/10/2020	1.00	0.13

The Beijing subsidiary Beijing Tianbing Technology is also the parent company of three wholly owned subsidiaries. This setup is unique to Space Pioneer, which overall presents an original structure.

The first subsidiary, established in 2017, is relatively large with a capital of 100 million RMB (13.2 million EUR) and is located in Suzhou, Jiangsu. It potentially serves as a production or R&D pole.

Another subsidiary is located in Tianjin, with a subscribed capital of 10 million RMB (11.32 million EUR). Tianjin is a key industrial and logistics hub, offering advantages in manufacturing and distribution.

A third, smaller subsidiary, with a capital of 1 million RMB, is based in Henan. Henan's location could provide logistical benefits for broader market access, or preferential policy environment.

Space Pioneer also stands out for its acquisition of ultra-majority (99%) stakes in companies located in Tianjin, as detailed below.

Name	Location	Creation	Capital Mio RMB	Capital Mio EUR	Name
Tianjin Tianbing Consulting Partnership (Limited	Tianjin	10/04/2019	99 %	2.00	0.26

Partnership) 天津天兵咨询合伙企业（有限合伙）					
Tianjin Tianbing Technology Partnership (Limited Partnership) 天津天兵科技合伙企业（有限合伙）	Tianjin	10/04/2019	99 %	1.50	0.20

The parent companies hold a significant 99% stake indicating near-total control. The registered capital is relatively low at 2000 kRMB (263,16 kEUR) and majority ownership (with 1% potentially held by a local partner) suggest smaller or specific role rather than large-scale operations.

Tianjin is known for its growing industrial and tech sectors, and this placement could provide Space Pioneer with proximity to important supply chains or industrial resources.

OrienSpace

Name	**Location**	**Creation**	**Capital Mio RMB**	**Capital Mio EUR**
OrienSpace Technology (Shandong) Co., Ltd. 东方空间技术（山东）有限公司	Shandong	16/10/2016	500.00	65.85
OrienSpace (Xi'an) Aerospace Technology Co., Ltd. 东方空间（西安）宇航技术有限公司	Shaanxi	29/08/2019	50.00	6.59
OrienSpace (Hainan) Technology Co., Ltd. 东方空间（海南）科技有限公司	Hainan	26/05/2022	50.00	6.59
OrienSpace Technology (Beijing) Co., Ltd. 东方空间技术（北京）有限公司	Beijing	19/04/2018	20.00	2.63

The company OrienSpace is firmly rooted in Shandong Province, where it established a hub with an initial capital of 500 million RMB (65.8 million EUR) at the time of its founding. 308

OrienSpace's public communications emphasize a strong territorial attachment to this province, which has a robust industrial base, particularly in the prefecture-level city of Yantai. Yantai is home to the Oriental Spaceport, which likely inspired the company's name. This connection is underlined in the establishment of this subsidiary, which appears to serve as a central hub. The hub hosts the manufacturing and assembly plant for launch vehicles, possibly focusing on major manufacturing, production, or high-value infrastructure critical to OrienSpace's operations.

A second, medium-sized subsidiary was established in Hainan in 2022 with a capital of 50 million RMB (6,58 million EUR). This likely reflects OrienSpace's ambition to integrate into an emerging aerospace ecosystem and to secure access to launch opportunities at the new commercial launch center.

A smaller subsidiary was established in 2018 in Beijing.

RocketPi

Name	Location	Creation	Capital Mio RMB	Capital Mio EUR
RocketPi (Beijing) Aerospace Technology Co., Ltd. 火箭派（北京）航天科技有限公司	Beijing	31/03/2015	10000	1.32
Yantai Qianheng Network Technology Co., Ltd. 烟台谦恒网络科技有限公司	Shandong	10/09/2018	10000	1.32

RocketPi has a presence in two key regions through wholly owned subsidiaries of similar scale, each with a capital of 10 million RMB (1,32 million EUR). The Beijing subsidiary was established in 2015, while the Shandong subsidiary is located in the prefecture-level city of Yantai, home to the Oriental Spaceport. Both regions are recognized as high-tech and aerospace hubs.

This strategic placement suggests a focus on technology development and R&D. By establishing itself in these regions, RocketPi appears to be positioning itself within cutting-edge aerospace and technology sectors, leveraging the local expertise and infrastructure to drive its growth and innovation.

RocketPi has also made a 57.84% investment for around 900 kRMB (118,42 kEUR) in the modest sized Nihuo (Taicang) Space Technology Co., Ltd., with the remaining shares held by other investors.

2. SOES Subsidiaries: Limited Territorial Presence

ExPace: Hubei

As indicated in the previous subsections, ExPace has not established any subsidiary, which is unique to all companies studied. Headquartered in Wuhan, Hubei Province, with a very large subscribed capital of 859.4 million RMB (113.1 million EUR) compared to other companies, it stands out as a company with an exclusively provincial presence—an entirely unique case among the companies studied.

It is likely that the company operates in a network with other CASIC institutes.

Given its size, impact within the local value chain, and privileged relationships with local authorities, ExPace may benefit from "local protectionism" from Hubei's provincial government. This could explain why none of the other companies studied have established a presence in this region in spite of its historical industrial and technological importance in the Chinese space launch sector.

ExPace has also made a minority investment in a third-party company.

China Long March Rocket: Shandong

Name	Location	Creation	Capital Mio RMB	Capital Mio EUR
Shandong Long March Rocket Co., Ltd. 山东长征火箭有限公司	Shandong	21/04/2021	275.20	36.25

In 2021, China Long March Rocket Co., Ltd. Has established a wholly owned subsidiary in Shandong Province with a substantial capital of 275.2 million RMB (36.2 million EUR), surpassing the parent company own capital of 219.7 million RMB (28.9 million EUR). The importance of the investment could aim to develop manufacturing, assembly or research and development capabilities in the region. As was hinted in previous Chapter V, the organization of SOE spin off remains opaque. It is not always clear whether these entities are directly involved in R&D and production, or if they are limited to the commercial sale of launch services.

Additionally, China Rocket holds a 20% stake, amounting to 3 million RMB, in Shenzhen New Blueprint Industrial Co., Ltd., a limited liability company based in Guangdong Province. This strategic investment could show an interest in diversifying its operations and establishing a presence in the Guangdong region.

Regarding the establishment of branches, the SOE subsidiaries studied—ExPace and China Long March Rocket—stand out at the time of the last data collection for the highly concentrated nature of their activities, which are limited to one or two provinces.

It is reasonable to assume that these companies benefit from the network of other institutes, research centers, and factories belonging to their parent companies. This is particularly true for China Long March Rocket, where such institutes have also contributed to its subscribed capital.

It is also possible that in the future, SOE commercial subsidiaries will diversify either their investments or the establishment of hubs in provinces with emerging commercial launch sectors. However, they would have less incentives to adopt a "prospective" approach by expanding into less developed provinces (e.g., Anhui, Eastern China) with uncertain development potential.

It is worth noting that the exclusive presence of ExPace in Hubei is particularly interesting, as it could be seen as a "stronghold". No other company has established a branch in the region, despite Hubei being a historical hub for aerospace activity in China. One hypothesis is that the presence of a value chain dominated by CASIC, combined with privileged relations with local authorities, has a deterrent effect on other companies, which instead prefer to establish themselves in other regional ecosystems—whether established, emerging, or speculative.

Similarly, although this is not reflected in the territorial distribution through wholly owned subsidiaries, China Long March Rocket is largely funded by laboratories based in Shanghai, which is also a historical hub for Chinese space activities, particularly launches. However, apart from Landspace, no company had established a branch in Shanghai at the time of these research—a city that is also notably absent as an investor in these companies. It is possible that a similar "stronghold effect" exists here as well. Nevertheless, recent policy changes could alter this trend, as the municipality of Shanghai has shown determination in promoting commercial space activities. This is particularly evident with the Qianfan constellation, which might explain the establishment of a Landspace subsidiary in the municipality.

3. *CAS: Beijing, Guangdong*

Name	Location	Creation	Capital Mio RMB	Capital Mio EUR
Beijing CAS Space Technology Co., Ltd. 北京中科宇航技术有限公司	Beijing	27/01/2016	450.00	59.27
CAS Space (Guangzhou) Equipment Industry Co., Ltd. 中科宇航（广州）装备工业有限公司	Guangdong	23/07/2018	100.00	13.17
CAS Space (Guangzhou) Propulsion Technology Co., Ltd. 中科宇航（广州）动力技术有限公司	Guangdong	22/05/2023	100.00	13.17
Hunan Aerospace Exploration Technology Co., Ltd. 湖南宇航探索科技有限公司	Hunan	02/11/2020	20.00	2.63
CAS Space (Hainan) Equipment Industry Co., Ltd. 中科宇航（海南）装备工业有限公司	Hainan	28/11/2021	20.00	2.63
CAS Space (Shandong) Equipment Manufacturing Co., Ltd. 中科宇航（山东）装备制造有限公司	Shandong	05/01/2023	20.00	2.63
Xi'an CAS Space Propulsion Technology Co., Ltd. 西安中科宇航动力技术有限公司	Shaanxi	30/05/2019	1.14	0.15

Compared to SOE spin offs, CAS Space presents an organization much more similar to that of private enterprises, both in terms of distribution and target provinces. The company has a profile notably focused on Guangdong, which hosts its headquarters as well as two technological and industrial hubs. It has a significant hub in Beijing, a feature common to most private companies. Medium-sized satellite entities have been established in Hainan and Shandong, along with a smaller hub in Xi'an—also typical destinations. The company has also established a medium-sized base in Hunan, possibly an example of a prospective investment as no other enterprise has invested in this region.

The wholly owned subsidiaries of CAS Space are distributed as follows:

A hub outside the parent company is located in Beijing, with an initial subsidiary capitalized at 450 million RMB (59,2 million EUR). Since the company headquarters are based in Guangzhou, Guangdong, it is possible that this move was compensated by establishing a strong hub in Beijing including corporate, recruitment and possibly some R&D.

Two subsidiaries, each with identical capital of 100 million RMB, are located in Guangdong. Their names suggest respective specializations in the equipment industry and propulsion. This aligns with data from other sources, including the company's official website and WeChat communications. The recent launch of the propulsion hub is frequently mentioned in the WeChat news feed over the study period.

In its public communications, CAS Space demonstrates a strong provincial attachment to Guangdong. While this attachment was less apparent in the origin of funds subscribed to the parent company, as discussed in the previous subsection, it is evident at the level of the subsidiaries' geographical presence. In addition to the parent company's establishment, there is a cumulative investment of 200 million RMB in the creation of infrastructure with significant industrial and technological impact.

Three additional subsidiaries were established with identical capital of 20 million RMB each in Hunan, Hainan, and Shandong. Both Hainan and Shandong host space launch facilities and are popular locations among private commercial space entreprises. It is noteworthy that these subsidiaries were recently established, in 2021 and 2023, respectively. On the other hand, Hunan is a more original, possibly prospective choice, possibly motivated by local beneficial conditions.

A small subsidiary, with a capital of 1.14 million RMB (150k EUR), is located in Xi'an, Shaanxi, was identified in an interview as a recruitement hub.

Section conclusion

The analysis of wholly owned subsidiaries reveals that while most private enterprises establish a strong base in Beijing, they also display diverse territorial strategies shaped by local advantages such as launch facilities, industrial infrastructure, or regional policy incentives. Provinces like Shaanxi, Shandong, and Hainan stand out for their strategic appeal, reflecting both historical ties to the space sector and emerging regional ambitions. In contrast, SOE

subsidiaries tend to remain centralized, while CAS Space mirrors the territorial diversification seen among private actors.

Chapter Conclusion

As we observed in this chapter, the shareholding structures of the commercial space launch companies studied differ significantly depending on the type of enterprise. Private companies are primarily funded by their founders and employees—a distinctive feature not found in either State-owned enterprise (SOE) spin-offs or in the case of CAS Space. A closer examination of the main investors reveals the presence of private capital, as well as SOEs and local government-guided funds. The SOE spin-offs, ExPace and CLMR, are chiefly financed by the laboratories of their parent companies—CASIC and CASC, respectively. Among their minority investors, central-level government-guided funds can also be identified. In the case of CAS Space, investment entities affiliated solely with CAS hold the majority of shares, whith a minority coming from private investment.

These findings allow us to refine the typologies of companies presented in the English-language literature reviewed in the Introduction, by enriching them with concrete financial data. Private companies do not benefit from central government support in the form of equity contributions, although some have received investment from what appear to be local government-guided funds (OneSpace, Deep Blue Aerospace, Space Pioneer).

These results also highlight the diversity of entities involved in the capitalization of commercial space companies—at least in the launch sector—including founders and employees, private equity and venture capital firms, SOEs, local and national government-guided funds, SOE laboratories, and CAS investment funds. The motivations and agendas of these varied actors contribute to the complexity of China's commercial space landscape.

The collection and analysis of these data also underscore the rapid evolution of the sector: from the significant increases in registered capital between 2020 and 2023 for the most successful launch firms (iSpace, LandSpace, Galactic Energy), to the stagnation of others (LinkSpace and OneSpace), and the diversification of shareholders in the case of ExPace. To better understand the future trajectory of these companies, it is valuable to have established, at several moments in time, a detailed archive of their financial structure relatively close to their founding. These data also enable cross-sectoral comparisons with other emerging industries, offering promising avenues for future research.

In the following section, we will examine the distribution of wholly owned subsidiaries of commercial space launch companies, further characterizing their profile.

Part 5 – Discourses from Commercial Space Launcher Enterprises: Field Study and Social Media

In the previous Part 4, we sought to characterize the launcher companies under study using quantitative financial data. In the following Part 5, we aim to further characterize the different types of companies and the relationships they maintain with one another through qualitative data: a field investigation involving a series of interviews (Chapter VII), and a study of commercial launch companies' social media publications over a six-month period (Chapter VIII).

VII. Chapter VII – Field Research

This chapter presents the results of two fieldwork investigations conducted in the PRC in April and May of 2023 and 2024.

It begins with an overview of the fieldwork context and methodological elements related to outreach and the conduct of interviews (Chapter VII.A). The results are then presented thematically, covering key insights regarding the different types of commercial space enterprises—private *minying*, SOE spin-offs, and mixed-ownership companies derived from CAS—as well as the relationships among them, the role of the policy framework, and the challenges encountered (Chapter VII.B).

Main Findings

Engaging with stakeholders and conducting interviews proved significantly more feasible than anticipated at the beginning of this research. This finding partly calls into question the prevailing myth of an impenetrable Chinese space sector: at least regarding the private commercial space segment, it was possible to conduct dozens of interviews while presenting myself transparently as a foreign researcher.

The vast majority of local stakeholders interviewed acknowledged the existence of distinct types of enterprises within the space sector. One individual objected to the use of the term *commercial*, arguing that such a label cannot coherently group both SOE spin-offs and private companies—a position that echoes the hypothesis explored in Chapter II regarding the possible "shell game" of SOEs presenting themselves as market players, thus "playing the market card" without assuming comparable risks or challenges. The status of SOE spin-offs remains contested: sometimes assimilated to traditional state space actors, sometimes presented as commercial entities. They are nonetheless consistently described as quite different from *minying* enterprises, which corroborates the finding on documentary sources presented in the previous Parts of this dissertation.

Field interviews reveal that the dynamics among different types of commercial space actors are more complex than suggested in the literature reviewed in Part I of this dissertation. That literature often portrays a harmonious complementarity between private and state actors—a narrative we already suspected might reflect politically correct discourse that glosses over more frictional relationships. In practice, some interviewees mentioned a degree of condescension

or even hostility from SOEs toward private companies, including difficulties in collaboration. The issue of skilled labor also emerged as a source of tension, with all commercial enterprises competing for a limited pool of human resources. Nevertheless, these relationships are not purely adversarial; they also include cooperative arrangements and reciprocal client-supplier ties.

The role of the state—both central and local—was consistently emphasized in interviews. Initially, the central government played a relatively hands-off role, providing broad encouragement for the development of the commercial space sector without detailing specific modalities. The entrepreneurial dynamic vis-à-vis central State authority is widely described as bottom-up. Local governments have played a crucial role by creating favorable conditions to attract space enterprises, notably through industrial zones. Relationships between provincial authorities and private space companies can be described as transactionnal. Today, a more active form of central state support is increasingly visible. According to some interviewees, this shift is seen as a lever to compel SOEs—if not to collaborate—then at least to stop obstructing the progress of private firms.

A. Initiating Contact

1. Context of the Field Research: China Space Conference and Beijing Stays

In addition to the documentary research presented in Parts 1 to 4 of this dissertation, two field research trips were conducted in the PRC in April and May of 2023 and 2024. The chronological organization of these two field studies followed a similar pattern: firstly, attending the China Space Conference (CSC), held in Hefei, Anhui Province, 23-26 April 2023 and Wuhan 23-26 April 2024, respectively. Secondly, conducting interviews in Beijing over a period of approximately 15 days. Due to the May 1st holiday week, interviews could not be conducted during the second week of each stay.

Participation in the CSC and the obtaining of a one-month research visa were made possible through an invitation from the Chinese Society of Astronautics (CSA), with whom prior contact had been established.

These two field research trips resulted in 30 exchanges, presented in the table below. The term "exchange" was chosen in order to reflect the diversity in the duration of discussions, which ranged from several hours (Exchanges nos. 2, 5, 6, 9, 16, 22) to a few minutes (Exchanges nos. 12, 21). The longer exchanges followed the format of a semi-structured interview, starting with a set of broad, identical questions for different participants, which then evolved into open-ended discussions shaped by the expertise and interests of the interviewees.

Some exchanges took place during the conference, particularly within the booths of the industrial hall, while others were conducted in Beijing, notably through contacts established at the China Space Conference. Three additional exchanges occurred at the Paris Air Show from June 19 to 25, 2023.

A preliminary field study was conducted during the 2019 CSC, which led to initial contact with several individuals who either directly participated in interviews or facilitated connections that made them possible. Below is the list of exchanges with stakeholders from the Chinese space industry during field research trips in China and the Paris Air Show (2023-2024)

Synthetic table of the exchanges conducted with Chinese stakeholders

No.	Date	Company/ Insitution Identification	Place	Position
1	13/05/2023	CAS-Related Satellite Company	Beijing office	Senior executive
2	06/05/2023	SOE	Hotel in Beijing	Senior executive
3	08/05/2023	Private Launcher Company 1	Beijing office	Employees
4	12/05/2023	Private Satellite Company 1	Restaurant in Beijing	Senior executive
5	11/05/2023	Consultancy Company	Restaurant in Beijing	Senior executive
6	14/05/2023	University in Political Sciences and Law	University library	Researcher specializing in space law and policy
7	15/05/2023	CAS-Affiliated Launcher Company	Café in Beijing	Employees
8	15/05/2023	Private Launcher Company 2	Beijing office	Employees
9	17/05/2023	Private Launcher Company 3	Beijing office	Co-founder
10	02/05/2023	Private Space Plane Company	Restaurant in Beijing	Senior executive
11	19/06/2023	CAS-Affiliated Launcher Company	Paris Air Show	Employee
12	19/06/2023	SOE Commercialization Spin-Off	Paris Air Show	Employees
13	19/06/2023	Private Launcher Company 4	Paris Air Show	Employee

14	16/04/2024	CAS-Affiliated Launcher Company	Hotel, Beijing	Employee
15	16/04/2024	Consultancy Company	Restaurant in Beijing	Senior executive
16	17/04/2024	CAS-Related Research Center	Beijing office	Academic expert in commercial space
17	17/04/2024	CAS-Affiliated Satellite Company	Beijing office	Senior executive
18	20/04/2024	Private Satellite Company 2	Restaurant in Beijing	Employee
19	24/04/2024	SOE	CSC exhibition hall	Employees
20	24/04/2024	Private Aerospace Component and Technology Company	CSC exhibition hall	Employee
21	24/04/2024	Insurance Broker Company	CSC exhibition hall	Employee
22	24/04/2024	Private Launcher Company 5	CSC exhibition hall	Employee
23	25/04/2024	SOE Spin-Off Launcher Company	CSC exhibition hall	Employee
24	25/04/2024	SOE-Affiliated Institute	CSC exhibition hall	Employee
25	25/04/2024	Private Launcher Company 4	CSC exhibition hall	Employee
26	10/05/2024	Private Launcher Company 5	Beijing office	Founder
27	10/05/2024	Private Launcher Company 3	Restaurant in Beijing	Employee

28	10/05/2024	Private Launcher Company 4	Café in Beijing	Employee
29	11/05/2024	Private Launcher Company 4	Café and office in Beijing	Employee
30	12/05/2024	Foreign Space Agency	Tsinghua University Cafeteria	Employee

2. *Initiating Contacts: Favoring Face to Face Encounter*

The China Space Conference (CSC) is an annual Chinese space event that takes place over several days around April 24. The conference includes an industrial exhibition, which in the two editions I attended was structured into three sections: one dedicated to the presentation of major national programs such as lunar and Martian exploration, crewed missions, and scientific programs; a second section featuring booths from the two major state-owned enterprises, CASC and CASIC; a third one dedicated to commercial space, bringing together numerous booths from smaller companies.

The industrial exhibition is a key place for direct networking, which was instrumental for conducting interviews. Since my case study focuses on small launcher companies, I systematically visited the booths of these enterprises while making occasional visits to other stands as time allowed. Based on the contacts established at CSC, I followed up with longer interviews in Beijing with those who were open to further discussions.

The conference is also an opportunity for numerous presentations by experts and companies, organized into thematic fora. I specifically attended the *Commercial Space Industry International Forum* [商业航天产业国际论坛 *shangyehangtian chanye guoji luntan*][380], and made occasional visits to other fora.

The CSC enabled initial contact and exchanges with employees from 11 different companies, leading to a total of 19 interviews across the two fieldwork trips. In most cases, involving minying enterprises and the CAS-affiliated company, CSC primarily served as a platform for initial networking, which was later followed by more formal and longer interviews in Beijing the following month. These took place either at company premises (exchanges nos. 1 and 17[381]; 3; 26) or in third-party locations (nos. 5 and 15; 7, 11, and 14; 28 and 29).

A particular case is that of a company where an interview was conducted at the Paris Air Show following initial contact at CSC 2023. This was followed by another exchange at CSC 2024

[380] Although efforts are made to give the event an international dimension—particularly during the opening ceremony or through the creation of forums dedicated to cooperation (with Latin America and Russia during the 2024 edition)—the presentations are, in practice, primarily addressed to a specialized domestic audience.
[381] The grouping in parentheses reflects interviews conducted with employees from the same company.

and discussions with several employees in May of the same year in Beijing (exchanges nos. 13; 25; 28; 29).

Overall, the CSC is an industry networking event, making it well-suited for initiating contacts. It is entirely appropriate to approach strangers there, ask them direct questions about the products and services developed by their company, and seek further information, as this can arguably be considered one of the main functions of a booth. However, CSC is less suited for conducting long-form interviews, as representatives at the booths must also be available to engage with other visitors, with commercial stakes for their companies.

In other cases, exchanges still took place directly at company booths. This was notably the case for employees of SOE Spin-Off Launcher Company and SOE-Affiliated Institute (exchanges nos. 23; 12), as well as two other companies: one specializing in the manufacture of launcher components and a specialized insurance broker company (exchanges nos. 20; 21). A similar exchange also occurred at the booth of an SOE Commercialization Spin-Off during the Paris Air Show (exchange no. 12).

Most of the initial contacts for interviews were made during the CSC 2023 and 2024. Other exchanges took place through different contact methods.

A preliminary field study was conducted during the CSC 2019, which led to initial contact with a senior SOE employee (exchange no. 2) and employees of minying launcher companies (exchanges nos. 4 and 18; 8). It is important to note that for some of these longer-standing contacts, relationships of trust and even friendship have developed, facilitating more open and possibly more candid exchanges.

As previously mentioned, the co-founder of a minying launcher company responded positively via email (exchanges nos. 9; 27). A co-author of a study on China's commercial space sector, working in a CAS laboratory, was also contacted through this channel (exchange no. 16).

During the April-May 2024 fieldwork, I was also put in touch with an employee of a foreign space agency who had co-authored a non-public study on commercial space as part of his research at Tsinghua University. This connection was made through a diplomat I met during the first field study.

Nearly all attempts at making contact via email or WeChat ended in failure. This method was initially considered during the first field study, where I sent out a round of emails to the publicly

listed addresses of all the companies and messages to the official WeChat accounts that offered such a function, but without success. It appears that remote contact with industry actors is ineffective, at least for foreign researchers, which may contribute to the sector's reputation for opacity among English-speaking authors. Zhang and Tsang also contacted their target commercial space entreprises via e-mail, with mitigated success[382]. Liu and al. recoursed to intermediaries in securing interviews.[383]

Several factors may explain the inefficacy of this approach. To arrange an interview through such means, it seems that the individuals contacted must obtain prior authorization from their superiors or dedicated departments, which represents both a source of concern and an additional administrative burden. The incentive to respond positively is further reduced by the fact that, having had no prior direct contact with me, these individuals have no indication of who I am apart from my foreign name, nor any clear understanding of my actual intentions. This may create a sense of distrust or, at the very least, a lack of interest: the cost-benefit calculation would not be in favor of granting me an interview.

An exchange with a senior executive from the satellite manufacturing company Private Satellite Company 2 (exchange no. 4) also revealed that concerns about “media exaggerations” and the risk of being placed on U.S. entities lists act as additional barriers to engaging with foreign interlocutors.

Conversely, an email contact attempt was successful in arranging an interview with Private Launcher Company 3. This exchange proved to be particularly fruitful, as it led to multiple discussions lasting several hours in 2023 and 2024 with the company’s co-founder, including one held at the company’s offices in Beijing.

However, in-person contact generally led to successful interviews, in some cases even within the companies' premises. The exchange of business cards or WeChat contacts, even without an in-depth conversation, seems to establish a relatively strong sense of trust. A former employee of a private launcher company, contacted through this method several years apart, was very open to dialogue, including after changing companies, and introduced me to a colleague still working at Private Launcher Company 2 (exchange no. 8).

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[382] Zhang and Tsang, “Knowledge and Innovation Within Chinese Firms in the Space Sector.”
[383] Liu et al., “Evaluation of China’s Commercial Space Sector.”

All field exchanges were conducted in Mandarin, which was likely a major facilitator of contact. However, it is worth noting that some individuals at the booths were enthusiastic about communicating in English.

The only case of a complete failure in establishing an exchange with a company occurred when a senior executive explicitly made it clear that she did not wish to conduct an interview and asked me to leave their booth during the China Space Conference 2024. This followed an initial contact attempt via WeChat in May 2023.

The company in question was a private launcher company, which, along with Private Launcher Company 3, was one of the only two firms that responded to a fully remote contact request without prior in-person interaction. In her WeChat response, a company representative informed me that she could not facilitate the organization of an interview.

During China Space Day 2024, this company had a booth in the commercial fair section, which I visited. After a brief exchange with a company representative, she realized that I was the person who had contacted them via their official WeChat account the previous year and mentioned that she had been the one to respond. I proceeded to ask a few questions, but she appeared visibly irritated and replied that she did not have time. This attitude was in stark contrast to that of all other interviews I conducted, where participants were generally patient—particularly in a context where the language barrier occasionally posed challenges during exchanges or where some of my questions may have unintentionally surprised or unsettled my them.

The following day, in her absence, I attempted to engage in an exchange with two junior employees at the booth, one of whom seemed enthusiastic about answering my questions. However, the second employee, who had witnessed the previous day's exchange between what appeared to be her superior and me, discreetly left in the middle of the discussion, seemingly to notify her superior via mobile phone. The executive then returned to the booth and asked me to leave.

It is possible that the initial unsuccessful contact attempt had created a negative preconception which worked against me later. It is also possible that factors such as personality, attitudes toward foreign researchers, or even clumsiness or impoliteness on my part played a role.

3. Self-Presentation, Notions of Objectivity and Sensitivity

At the industrial fair of the China Space Conference, I adopted the following approach to initiate an exchange: I would visit booths and start with a simple question such as, "*What does your company do?*" or "*It looks like you manufacture satellite components, is that correct?*" This initial approach often elicited a positive reaction of surprise from my interlocutors upon realizing that I spoke Mandarin, sometimes followed by a detour in the conversation where I explained how I had learned the language. This detour also provided an opportunity to clarify my approach in terms that I hoped would ease any concerns my interlocutors might have.

I introduced myself as a doctoral student at the French National Center for Scientific Research (CNRS), which seemed easier for my interlocutors to identify than other affiliations, sometimes drawing a parallel with CAS. It also seemed important to clarify that I was a researcher, with the implicit message that I was not working for private interests, nor for the government of my country or any other, and that I was not a journalist either.

I specified that I had been officially invited by the Chinese Society of Astronautics, an institution recognized in the space sector and a co-organizer of the CSC, hoping that this would reassure my interlocutors and lend me a certain degree of credibility in their eyes.

I explained that I was studying China's commercial space sector in the context of a lack of objective information on the subject in France and Europe. On some occasions, I emphasized that most English-language literature on the topic, primarily originating from the United States, contained certain biases and did not allow French and European policymakers to formulate an independent, well-informed strategy. The purpose of this clarification was to present myself as an ally to my interlocutors in relation to a "dominant Western narrative", which I knew was often criticized by national mass media in the PRC. This explanation reflected honestly perspective, while being framed in a way that I thought was likely to resonate with my interlocutors.

The term "objective" was inspired by a professor from Beihang University, to whom I had presented my research project during my preliminary fieldwork in 2019. He had used this term to describe my approach. It was also spontaneously used by a friend working in a SOE, to whom I had shown my work for feedback. On multiple occasions, interviewees nodded in agreement when I used the term, which encouraged me to continue using it when introducing myself.

The choice of questions, particularly the initial ones, was deliberately designed to avoid any sensitive topics and encouraged a conventional form of communication about the represented companies, an exercise I assumed was expected at a trade fair.

The question of what constitutes sensitive information is far from having a clear definition, even though it is a key factor in ensuring that an interview takes place under the best conditions. For example, an interviewee from the CAS-Affiliated Launcher Company with whom I had developed a good rapport jokingly remarked during a conversation in the presence of a third party vlogger I had introduced to his company: "*You ask us technical questions, which we have no problem answering, whereas she, he gesturing toward me, asks sensitive questions [敏感 mingan, like, about our investors!"* Yet, the investment structure of companies is publicly accessible in the PRC, and this data forms the basis of the research conducted for Chapter VI.

The criteria for what was considered "sensitive" or "classified" [保密 *baomi*] sometimes seemed unclear to me. For instance, my visit to the premises of Private Launcher Company 2 (exchange no. 8) began in a hall designed as a small company museum, complete with display cases, a chronological timeline, and models. Despite this museum-like setup, taking photographs was not allowed, as the space was considered "classified."

Similarly, during my interview with a senior executive from a specialized Consultancy Company (exchange no. 5), I was allowed to consult a non-public report that the person had brought specifically for the occasion. When I asked to take photos of certain pages, she decided on a case-by-case basis what could be photographed—mainly lists of documents, explaining, "*These are public texts*", but not the analyses. Yet, those lists were the result of an original compilation effort that was far from self-evident and serves as a foundation for Chapter III of this dissertation.

It is worth noting that this ambiguity regarding what is considered sensitive also seems to affect professionals in the sector themselves. During my interview at the offices of Private Launcher Company 5 (exchange no. 26), I asked to take a photo of a presentation slide specifically discussing investors on the power point presentation they were giving me. The four people present deliberated among themselves to determine whether or not I could take the picture, ultimately deciding, out of caution, to decline my request.

An employee of Private Launcher Company 4, whom I was meeting for the first time (exchange no. 29), casually suggested, at the end of our discussion, that I accompany her to the company's

offices—located in the same building as the café where we were sitting—so she could lend me an umbrella on the way. However, my other contact, with whom I had had conducted two interviews in the past, including one earlier that same day in the same café (exchange no. 8), had previously told me that I could not enter their offices.

I did not seek to raise hopes of commercial cooperation with French companies, although it seems that in some cases, it may have been an underlying assumption behind the acceptance of my interviews (exchanges nos. 4, 17). I clarified that my dissertation work, being public in nature, could help increase awareness of the companies involved in France and Europe but that I could not engage in commercial promotion on their behalf.

How these different elements of discourse were perceived remains an open question. In any case, with the exception of the previously mentioned employee from the *minying* launcher company, they generally led to exchanges in a friendy and relaxed atmosphere and resulted in fruitful interviews.

I am not certain that my approach was always fully understood, as the idea of a social science dissertation on a foreign country's commercial space sector may have seemed quite distant from the concerns of many of my interlocutors—something that is not unique to the Chinese context. However, it appears that they did not interpret it as a cover for espionage, or if they did, they did not see it as an obstacle to engaging in discussions. This was my primary concern and the main difficulty I anticipated when setting up field interviews.

These concerns were not entirely unfounded, as several examples will illustrate. After failing to reach companies by email, I visited the headquarters of several *minying* launcher companies in May 2023 in an attempt to establish contact, but this method proved just as ineffective. At one of these companies, I managed to enter the reception hall, which was completely empty. Finding no receptionist, I waited until an employee, about to leave for the day, arrived and asked him whether a press or public relations office was located in the building. The man visibly panicked, repeatedly insisting that he was just a regular employee, raising his voice until he was shouting and attracted the attention of another employee and a security guard. In an increasingly tense situation and unable to communicate my request peacefully, I left the building.

Another person I had met at the IAC in September 2022 in Paris, who later became a key contact, confided to me several years later during a conversation in Beijing (exchange no. 8) that he had been quite unsettled by our first meeting, during which I had asked questions about the

Guowang mega-constellation project, a topic he then told me was considered sensitive. Looking back on our initial conversation with humor, he said, “You scared my colleague to death!” He also mentioned that his own curiosity had ultimately driven him to continue engaging with me, giving me the benefit of the doubt.

The fieldwork was thus marked by a dual requirement for audacity and caution. Audacity was necessary to establish contact and conduct as many interviews as possible within a very short time, in an environment with ill-defined conditions (contact methods, rules of politeness, security protocols, and the sensitivity of certain topics). Caution was equally essential to avoid alarming or alienating my interlocutors.

4. Ease of Exchanges

On the contrary, it seemed to me that the people I met at the booths were pleasantly surprised and generally eager to engage in discussions with a foreign researcher. I did not encounter xenophobic attitudes or distrust toward foreigners; rather, the opposite. In this regard, it is also worth noting that my interlocutors' perceptions may have been influenced by my Caucasian ethnicity, my French nationality, and my female gender. In the socio-cultural context in which I was operating, these factors were likely associated with predominantly positive representations, inspiring trust and interest.

The context of CSC 2023 was also unique, as it took place during the country's very recent reopening to foreign exchanges following the COVID pandemic. Foreign nationals were rare, and even more so foreign women. I was moving around alone rather than as part of a delegation and spoke Mandarin, a combination of factors that placed me in an extreme minority and may have contributed to the heightened curiosity of those I interviewed.

Furthermore, an employee of the French Embassy in Beijing mentioned a “wave of Francophilia” following President Macron’s visit[384], which may have played a role. This visit also led to the presentation of lunar rock samples collected by the Chang’e 6 mission from the far side of the Moon, serving as a reminder of ongoing space cooperation between the two countries.[385]

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[384] Qingqing Chen, “France, EU Leaders Begin China Visit with China-France, China-EU Ties in Focus - Global Times,” *Gloabl Times* (blog), April 5, 2023, https://www.globaltimes.cn/page/202304/1288570.shtml.
[385] “China’s Lunar Sample Gifts to France, Russia Have Scientists over the Moon,” *South China Morning Post* (blog), April 24, 2023, https://www.scmp.com/news/china/science/article/3218138/chinas-lunar-sample-gifts-france-russia-have-scientists-over-moon.

During some long-form exchanges in Beijing, I also had the impression that my interlocutors, to some extent, sought to confide in me, perhaps viewing me as an outside listener and posing no risk to their careers. Some discussions indeed revealed frustrations regarding relationships between different types of companies (exchanges nos. 8, 5, 9, and 27) or toward employers (exchange no. 14). The impression of "confidences" was reinforced by certain attitudes and remarks: two persons interviews spoke in hushed tones about certain aspects of our exchanges, one of them in a space that was yet completely empty. Another interviewee jokingly concluded a sentence by saying, "*Well, now you know all our little secrets!*"

It is interesting to note that opacity was explicitly pointed out in interviews as a characteristic of state-affiliated enterprises (exchanges nos. 1, 5, 7, 9). More specifically, in exchange no. 9, the founder of Private Launcher Company 3 explained that the connection with military entities, particularly launch sites, or with suppliers subject to confidentiality restrictions—such as purchases from CASC—forced even private companies to implement protective measures. Nonetheless, it was still possible to engage in natural conversations with representatives of state-owned enterprises at their booths during both the Paris Air Show and the CSC.

5. Methodological Questions

To ensure the safety and peace of mind of the interviewees, all participants have been anonymized, as well as the name of their enterprises or units. This practice is common for research on this subject.[386]

For security and confidentiality reasons, no recordings were made during the field interviews. Instead, notes were taken and later transcribed into an electronic text document. This decision was based on two key concerns. Firstly, it was anticipated that the use of recordings could negatively impact both the feasibility and content of the interviews. There was a risk that the presence of a microphone might put interviewees on edge, leading either to outright refusals to participate in any context (even without recording) or to self-censorship in their responses.

Secondly, the absence of recordings also served as a safeguard for my own security in case my activities were perceived as espionage and led to legal repercussions in the PRC. If such recordings were found in my belongings, they could be considered incriminating evidence to a

[386] Liu et al., "Evaluation of China's Commercial Space Sector"; Walsh, Christensen, and Ronci, "Lost Without Translation - Identifying Gaps in U.S. Perceptions of the Chinese Commercial Space Sector"; Han et al., "A PIE Analysis of China's Commercial Space Development."

much greater extent than handwritten notes, which were taken in a mix of English, French, and pinyin, making them difficult to interpret for an external reader.

Taking notes instead of recording interviews presents certain drawbacks. During the interviews, it required asking respondents to repeat their statements when something was unclear. In the long term, it increased the risk of information loss or misinterpretation due to errors, omissions, or gaps in note-taking.

Since the fieldwork took place relatively late in the dissertation research process, the approach adopted during these investigations was shaped by prior work. Rather than entering the field with a completely open mind, I had been actively studying the commercial space sector for several years and had already formulated a number of hypotheses and research questions.

As a result, the fieldwork primarily served to test and refine these pre-existing hypotheses against the practices and discourse of key industry actors. To a large extent, the field research and interviews tended to confirm the hypotheses that had been developed from written sources. They also provided new perspectives on certain aspects of my research and helped establish a hierarchy of significance among various findings.

For example, the distinctions between different types of companies, which appeared relatively novel and difficult to discern in English-language literature, were self-evident to industry insiders: no interviewee considered ExPace a *minying* enterprise, for example. Conversely, my hypotheses regarding economic structures, particularly the concept of *minying* enterprises, which played a central role in my early research, often led to confusion or discomfort among interviewees, including a law instructor. This suggests that such concepts are not commonly used by operational actors in the sector.

B. Findings

1. A Clear Distinction Between Different Types of Enterprises

a. *Minying Enterprises on the One Hand, State Owned Enterprises and Their Spin Offs on the Other*

For those interviewed, the presence of a diverse range of companies within the commercial space sector is an established fact. In particular, a strong distinction was made between state-owned enterprises (SOEs) and private or minying enterprises. These findings corroborate the research results from the previous chapters.

An employee of an SOE used the terms "national team" [国家队 *guojiadui*] and "popular forces" [民间力量 *minjian liliang*] (exchange no. 19).

An employee from SOE Spin-Off Launcher Company differentiated between guojiadui and minying enterprises. He explained that SOEs and minying enterprises together form a complete and complementary system for the commercial space sector [配套 *peitao*] (exchange no. 23).

Conversely, the co-founder of Private Launcher Company 3 challenged the very notion of "commercial space", arguing that it lumps together SOEs and private enterprises, which operate under unequal conditions of competition. He advocated abandoning the concept altogether: "*The concept of commercial space is not working to begin with.*" (exchange no. 17). He further insisted: "*Don't speak of commercial space* [商业航天 *shangye hangtian*], *speak of* private (in English) *space."* (exchange no. 9).

It is particularly interesting to note that his perspective, which excludes state enterprise spin-offs in the same way as some authors in Chapter II of this dissertation, finds an unexpected echo in the words of an SOE employee (exchange no. 19). She emphasized the unique status of SOE spin-offs, stating that ExPace should be considered a state-owned enterprise operating in the commercial market.

The exchange with employees of Private Launcher Company 2 (exchange no. 8) also clarified the scope of the term *minying*. The term specifically refers to private [私有 siyou], though the latter is simply not used in this context: "Private (in English) *is minying, siyou we do not talk about*. *We speak about minying* [民营] *and State Owned* [国有 *guoyou*]."

Across the interviews mentioned above, the presence of both SOEs and minying enterprises is undisputed. However, the classification of CAS spin-offs remains more ambiguous. CAS Space was spontaneously described as either a minying enterprise or sometimes as a mixed enterprise.

This result aligns with the findings from previous chapters based on documentary sources. In the case of launch vehicle manufacturers, while foreign observers may perceive some ambiguity, the original Chinese names of the companies are clearly identifiable, as demonstrated in Chapter V. The next chapter will show that their communication on WeChat also leaves little doubt about their identity, particularly in distinguishing *minying* enterprises from SOEs, with CAS Space presenting a somewhat in-between communication style.

b. *The Particular Case of Companies Within the CAS System*

The mixed enterprises from CAS where interviews were conducted appeared to enjoy a certain degree of independence from their parent institution. The resentment that CASC and CASIC employees might face after transitioning to the private sector, as suggested in some interviews and literature[387], did not seem to be an issue for them. The executive from CAS-Affiliated Satellite Company stated that he had been encouraged to create a company with other colleagues, members from the same CAS laboratory. According to him, CAS operates in a wide range of fields, with space being only a part of its activities, and previously had no lucrative space-related business. Therefore, there would be no competition between the parent institution and its mixed-ownership affiliated enterprises.

Technology transfers in both directions were mentioned at CAS-Affiliated Satellite Company. The mixed enterprise would own its technologies and patents, which were likely initially developed by CAS, and would provide services to CAS-affiliated end clients, particularly research teams, to whom they would charge for services. This company is also considering a partnership with CAS Space for the launch of its intelligent satellites. Interestingly, the executive interviewed referred to CAS Space as a *minying* enterprise, highlighting the ambiguous status of CAS's mixed enterprises, as discussed in the previous subsection, even in the eyes of a senior member of such a company.

However, the CAS-Affiliated Launcher Company is subject to competition from private companies. An employee stated, "*In terms of technology, we are comparable to minying*

[387] Deville and Thibault, "La guerre des talents aura-t-elle lieu ?"

enterprises" (exchange no. 7). When re-interviewed the following year, he shared (exchange no. 14), "*One year later, the situation has completely changed.*" The company was originally the leading commercial large solid-fuel launcher, but in the meantime, OrienSpace had claimed that title, overshadowing them. Nevertheless, the company had signed contracts with partners in Egypt and Mexico.

A Private Launcher Company 4 interviewee (exchange no. 13) indicated that, in her opinion, purchasing components from SOEs would be easier for CAS Space. This remark can be contrasted with the difficulties mentioned in several interviews about the case of Landspace and the more general attitude of disdain among some state-owned enterprise employees toward *minying* companies, which was also witnessed firsthand. Conversely, a company's affiliation with the CAS system could grant it a better reputation and thus preferential treatment, such as faster processing times or less aggressive price negotiations. This more favorable treatment could be linked to corporate culture considerations discussed in the following chapter: CAS is recognized as a historical space player, even though it does not hold the dominant position of CASC and CASIC. It is seen as an heir to a certain work ethic respected by SOEs—"the aerospace spirit"—dating back to the Maoist era.

2. Between cooperation and competition

a. *Supplier Ties*

Interviewees clearly identified the presence of both SOEs and minying enterprises. When asked about the relationships between SOEs and private enterprises, several interviews mentioned cooperation or complementarity (exchanges nos. 1, 3, 6, 13, 23). Others referred to partial competition, describing a relationship that was both competitive and complementary (exchanges nos. 2, 8, 22), or even a form of "forced" complementarity (exchanges nos. 5, 7).

The emphasis on cooperation between these different actors is particularly exemplified in client relationships, where SOEs supply components to private companies (exchanges nos. 3, 23). Conversely, services offered by private companies, such as testing, were also mentioned (exchanges nos. 20, 27).

An employee at an SOE Spin-Off Launcher Company stated that there was no real competition, saying, "*They are all our clients.*" He was possibly referring to satellite manufacturers and specifically mentioned CGSTL, which is a mixed enterprise spun off from CAS rather than a purely private company (exchange no. 23).

An SOE executive explained that minying enterprises purchase various components from CASC and can also use or rent testing facilities. However, he specified that SOEs, in contrast, could not take private companies as subcontractors (exchange no. 2).

Most private commercial launch companies interviewed, except for Private Launcher Company 3, reported purchasing components—sometimes developed in-house—from SOEs. Private Launcher Company 1, for example, described having relatively open relationships with SOEs, stating that most components of its launchers were purchased (exchange no. 3). An employee at Private Launcher Company 4 clarified that while the company did not have a direct relationship with CASC or CASIC, purchasing components from them was possible depending on the neeeds (exchange no. 13). Employees at Private Launcher Company 5 emphasized the importance of their in-house-developed systems, particularly their engines, and mentioned ordering components internally-designed, but did not specify their contractors (exchanges nos. 22, 26).

b. *A Dismissive Attitude of SOEs Towards Minying Enterprises*

That said, these client relationships are not always straightforward, as illustrated by the emblematic case of Landspace. Initially, the company planned to manufacture a solid-fuel launcher and had secured an agreement to purchase an engine from CASC, the former employer of its founder. However, likely due to internal disputes within the SOE (exchange no. 28), the sale was abruptly canceled at the last minute. The deal between Landspace and CASC had seemingly been based on personal relationships, but "*a leader [at CASC] learned about it and said: 'stop'.*" As a result, the company pivoted entirely toward liquid methane-oxygen propulsion, developing its own engine.

Landspace's case is particularly interesting because the company ultimately pursued a more innovative path. Its successful launch on July 12, 2023, marked a world-first for methane-liquid oxygen propulsion. Ironically, this innovation was driven by failure to contract with an SOE. This case also highlights other key characteristics of China's commercial space sector, including the mobility of personnel between SOEs and private enterprises and the significant role of personal relationships.

Tensions between established players and newcomers, which were hinted from documentary research, were confirmed in interviews with individuals who felt more comfortable speaking

candidly, such as long-term acquaintances, industry outsiders, or participants in second-round interviews (exchanges nos. 2, 3, 5, 7, 9, 26, 28).

SOEs appear to maintain a degree of skepticism toward private companies, often expressing it through a dismissive attitude. For example, during an interview with a senior executive at an SOE (exchange no. 2), he noted: *"There are no openly stated limits on private companies, as that would create a bad image, but you can feel it in the dialogue [...]. It is conveyed through boasting about their own capabilities or making private companies feel like 'incorrect forces'* [不对的实力 *budui de shili*]."

Employees at Private Launcher Company 1 shared a similar perspective (exchange no. 3), stating: "*They look down on us, objectively. We are very different; it's like comparing an elephant to a little bee. In the future, perhaps we will be in competition*". Employees at CAS said "*They are like our 'big brothers'; it's not comparable*" (exchange no. 7). An employee at Private Launcher Company 4 also mentioned a sense of disdain from SOEs toward commercial enterprises (exchange no. 28).

Employees of Private Launcher Company 5 (exchange no. 26) described "*a slightly competitive attitude*" despite "*differences in capacity*". They added, "*The state's support is now very clear, so they don't really have a choice [about cooperating with us]*".

An executive at a specialized Consultancy Company (exchange no. 5) noted that commercial enterprises represent a challenge for SOEs because their primary customer is the military, which offers a fixed price regardless of the contractor. The emergence of new competitors forces SOEs to rethink their cost structures. For now, commercial companies must "complement" rather than compete to survive. Few commercial enterprises would be in a position to secure military contracts, so they would focus on niche markets, such as educational institutions.

When asked about private companies, employees at the SOE Commercialization Spin-Off booth at the Paris Air Show (exchange no. 12) responded with laughter, making dismissive comparisons between launchers developed by private enterprises and those developed by their corporation. Another interview referenced the unbalanced pricing practices of SOEs when selling components to private companies (exchange no. 28).

It is possible that, as suggested by employees from Private Launcher Company 1 and Private Launcher Company 5, SOEs see commercial space companies, particularly minying enterprises, as future competitors. As seen in Chapter V, technological competition has not yet materialized

in the launch sector, as private models are still in testing or early qualification launch stages. They are not yet eligible for costly commercial satellite launches, let alone for state-owned civil or military satellite contracts.

c. *The Talent Issue*

Several interviews highlighted that a significant portion of technical staff and executives originally came from the state sector (exchanges nos. 3, 8), and in some cases were even "poached" [挖掘 *wajue*] (exchange no. 28), in a context of intense circulation of technical personnel. A CAS researcher specializing in commercial space (exchange no. 16) explained: "*SOEs are afraid that they are going to lose talents and profit*." An interview with an employee of a foreign space agency who had worked on commercial space (exchange no. 30) indicated that the early days of China's commercial space sector were marked by "*a huge influx of technicians towards commercial space at the opening, 'fleeing' [from the public sector]*."

This issue was also highlighted in interviews with minying launch companies. At Private Launcher Company 1 (exchange no. 3), technical staff primarily came from CASC and CASIC, while management teams had cross-industry backgrounds. "*Commercial space brings diversity into companies*". Their senior members included professionals trained abroad in IoT, while their CFO came from the drone industry. "*Everyone has a technical background, but from different industries […] The team is younger; the difference [from SOEs] is visible*".

This perspective aligns with statements from CAS-Affiliated Launcher Company employees (exchange no. 7), who described their hiring practices as relying on job-hopping, particularly from the aviation sector, as well as the xiahai [下海]—the "plunging into the sea"—of former SOE employees and executives into the private sector.

At Private Launcher Company 2 (exchange no. 8), part of the staff previously worked in the state sector, while many young recruits were trained internally [自己培养 *ziji peiyang*], particularly recent graduates in aerospace and aeronautics.

When asked why they left the traditional sector, employees of Private Launcher Company 5 (exchange no. 26) cited three main factors: state support, rapid innovation, and the successes of SpaceX.

An employee from Private Aerospace Component and Technology Company (exchange no. 20) explained simply that "*It's more fun!*" Another employee at Private Launcher Company 2

(exchange no. 8) added, "*Everyone joins for their own reasons. I suppose they think growth will be faster*". Interestingly, he viewed talent loss from state enterprises as a positive development from a macro perspective, stating that public enterprises "*Lose people, but it is for a greater contribution to the space sector*".

Employees of Private Launcher Company 5 (exchange no. 26) also mentioned that their staff had an average of 14 years of experience in the space sector, which suggests that many had left SOEs.

The high-profile media coverage of certain cases of talent poaching was identified not only as an irreparable loss for SOE teams (exchanges nos. 3, 16) but also as a source of negative publicity for SOEs in relation to the private sector (exchange no. 5). An employee at Private Launcher Company 1 noted that highly qualified personnel in SOEs were rare and that "*if the chief designer leaves, then it's complicated*". He also emphasized the irreversible nature of such a departure: "*If you leave, you leave forever*".

An interview with an employee at Private Launcher Company 4 (exchange no. 28) revealed that only private companies could hire graduates who had studied abroad. The employee also mentioned that, for an equivalent profile, career advancement was faster in private companies than in SOEs. "*In function of your major, you can have a faster career*", with comparable salaries at this level.

The circulation of talent was also discussed: Shu Chang, the founder of OneSpace, originally worked at Landspace (exchange no. 5). The founder of Space Pioneer was the former CTO of OneSpace (exchange no. 15). The founder of iSpace came from CASC's First Institute (exchange no. 22). The father-in-law of Landspace's founder was a former SOE employee (exchange no. 30).

The importance of interpersonal relationships and networking was emphasized in an exchange with an SOE executive (exchange no. 2) and implied in a conversation with an employee of a private satellite manufacturing company (exchange no. 4).

Although private enterprises offer less job security, they provide attractive working conditions for many (exchanges nos. 2, 19, 21, 28). These advantages include a flatter hierarchy, encouragement of risk-taking and innovation, more diverse and flexible job roles, faster career progression based on merit rather than political alignment, and younger teams.

Conversely, an interviewee from the public sector (exchange no. 19) highlighted greater job stability in SOEs and less demanding working hours: “As a woman, [I had the] desire for a more stable lifestyle, with less pressure.” This point was also mentioned by a researcher from a CAS-Affiliated Research Center (exchange no. 16), who noted that in private companies, employees had to work “hundreds of hours per week” to ensure the company’s survival.

d. *Hidden Frictions?*

The hypothesis that there would be potential friction between different types of enterprises, particularly between SOEs and private companies, masked by a politically correct discourse as was hypothesize in Part 1 of this disseration, was both illustrated and nuanced in the interviews.

The existence of “hidden” friction was evidenced by interviews where such tensions were explicitly mentioned. These discussions took place under particular conditions, generally involving a degree of trust or familiarity with the interviewees, whether through long-standing relationships or extended interviews lasting several hours.

However, these frictions were also tempered by other exchanges. Initially, we hypothesized that the discourse around “mutual complementarity” between SOEs and private enterprises was merely politically correct or even hypocritical. In fact, some interviews suggested the presence of genuine client relationships in both directions, particularly in sectors outside of launch services.

An exchange with a law instructor at an University of Political Sciences and Law (exchange no. 6) highlighted that CASC and CASIC are not in actual competition with commercial launch enterprises: “*They have lots of funds, they are not worried. If they really want to do commercial space, they do it through their business fund, it still is the State*.”

CAS Space employees (exchange no. 7) explained, “*We cannot compete, so we complete”*. SOEs operate within their own system, governed by “*very strict, very secret*” state regulations, while commercial enterprises would be “*more flexible and adjustable*”. Commercial space would thus serve as a necessary backup. CAS Space positions itself outside the SOE system, with a technology level comparable to private companies and possibly different salary structures. However, interviewees suggested that commercial spin-offs from SOEs remain part of this system, echoing the perspective of the CAS employee (exchange no. 19) who stated that “ExPace is a state-owned enterprise entering the commercial market.”

An employee at Private Launcher Company 4 (exchange no. 13) stated that the company was a complement rather than a competitor to SOEs. However, it was a competitor to SOE spin-offs, which, she admitted, were superior.

An employee from Private Launcher Company 2 (exchange no. 8) considered the company to be "*partly a competitor*" to SOEs. An employee at Private Launcher Company 5 (exchange no. 22) clarified that they complemented each other but "*not entirely, [we are] also competitors*".

An interviewee at Private Aerospace Component and Technology Company (exchange no. 20) was surprised by the question of whether public and private entities were in competition, stating, "*The state encourages us to go private. We have received support from ExPace, the Space Fund, and the Wuhan municipal government.*" According to him, a company's nature would have no impact on securing contracts with public enterprises: "*The important thing is to meet the standard; the rest is not important.*"

e. *Different Corporate Cultures*

Employment-related discussions provide insight into the broader cultural differences between traditional space and China's New Space sector. The CAS researcher specializing in commercial space (exchange no. 16) linked debates within China's commercial space industry to a much broader economic discussion: the national team [国家队 *guojia dui*] versus the new forces [胜利群 *shengli jun*]. Whether they could coexist has been "*debated forever*", and whether they could achieve the "*common goal of prosperity*" remained "*controversial*".

During an interview with an employee from a specialized Consultancy Company (exchange no. 5), she elaborated extensively: "*All [SOE departments] would like to have the same productivity as private enterprises, but they can't. Their culture is different. It's not good"*. A situation she summarizes as "*the bottom defines the brain*［屁股决定脑袋 *pigu jueding naodai*]". This phrase, often used in political and business contexts, suggests that an organization's hierarchical position and bureaucratic structure fundamentally shape its management decisions and strategic outlook. In the case of SOEs, their longstanding institutional frameworks may constrain adaptability and innovation compared to private firms.

According to her, the founders of commercial enterprises—who have multiplied since 2014—were highly educated professionals working in the state sector, where there was "*zero tolerance for failure, contradicting the possibility of innovation*," and a "*certain political culture*." She

summarized: the goal of private enterprises would be to make as much money as possible, whereas for public enterprises, it would be to avoid squandering taxpayers' money.

An SOE executive (exchange no. 2) also commented: "*People who moved to the private sector didn't fit the atmosphere [of SOEs]... It's not an industrial issue, it's a mindset* [心态 *xintai*] *issue.*" An employee at Private Launcher Company 4 added: "*There are too many people [in SOEs], and the processes are too long*" (exchange no. 28), which partially aligns with the findings in Chapter II.

In an interview with the co-founder of Private Launcher Company 3 (exchange no. 9), he noted that private companies were less risk-averse, willing to explore new technological avenues, and more cost-conscious than state enterprises, whose funding was guaranteed. This financial security also came with a level of responsibility that greatly influenced SOEs' low tolerance for failure: unlike private startup investors who engage knowingly, SOEs could not afford to "*throw taxpayers' money out the window*" (exchange no. 5). State enterprises were less inclined toward innovation since they did not need to maximize their orders, whereas for private enterprises, the "*need to make money*" served as a "*drive for innovation, in order to be more sustainable*"—"*minying enterprises have to make a living*" (exchange no. 16). An SOE employee also noted that SOEs' greater caution would also stem from the higher value of the payloads they transported (exchange no. 19).

Criticism of the traditional sector would include a culture that discouraged risk-taking, political inertia, and lower productivity. In contrast, private enterprises faced challenges such as financial constraints, technological immaturity, and market speculation.

3. Role of the Government and Policies

a. *The creation of Commercial Space Launch Enterprises: a Bottom-Up Phenomenon?*

Field interviews conducted with private and mixed launcher companies tend to describe the creation of such enterprises as a bottom-up phenomenon (exchanges nos. 2, 3, 4, 5, 6, 9). An employee of Private Satellite Company 1 (exchange no. 4) summarized it as follows: *"[Entrepreneurs] just said, 'Hey, I'm going to do commercial space.' In China, there is this drive to make money. They didn't necessarily think further; they asked friends to invest, for example, people already in the industry.*"

As was underlined in Chapter III and IV, the timeline also suggests that the success of commercial space may have exceeded government expectations, as well as the early policy framework for launch vehicles. These companies were not initially mentioned in policy documents, and the first orbital launch attempts by private enterprises—Landspace on October 17, 2018, and OneSpace on March 27, 2019—took place before the publication of the first policy dedicated to commercial launches in June 2019, the *Notice on Promoting the Orderly Development of Commercial Launch Vehicles.*

An interview with an employee of a specialized Consultancy Company further highlights this issue (exchange no. 5). The studies conducted by the company were deemed necessary for central government agencies, as data was crucial for decision-making: "*The State needs to understand how development is progressing—at first, they had no idea*". The firm had reportedly specialized in this domain through its investment activities, beginning with case studies on Landspace and later MinoSpace. The senior worker said they were, at the time of the interview, a shareholder in about ten space companies, aiming to "*cover the entire value chain*". Thanks to this expertise in due diligence, they reportedly attracted government interest starting in 2017.

An interview with a researcher from a CAS-related research center (exchange no. 16) also pointed out that the previous policy framework was vague, with the central government's message essentially being: "*We support commercial space, without knowing what it is or how to proceed*". He was particularly enthusiastic about the outlook for all types of enterprises following the recognition of commercial space as part of the "*new quality productive forces*", which he saw as a turning point toward a new government agenda.

An employee of Private Launcher Company 5 (exchange no. 22) stated, referring to government announcements in 2024 to include the developpement of commercial space in the central government's work report as a "New Quality Productive Force" [新质生产力 *xinzhi shengchanli*]: "*The State is attracting us to the field. For example, the recent "working plan" will have a lot of influence*."[388] Similarly, an employee at Private Launcher Company 4 (exchange no. 27) emphasized the importance of the government designating commercial space as part of the "*new quality productive forces*". While concrete policy tools are still to be

[388] Note that while the interviewee said "working plan" [工作计划 *gongzuo jihua*] the document is a "work report" [工作报告 *gongzuo baogao*]

developed, this is already considered "*a good signal*", particularly for commercial enterprises. According to her, state-owned enterprises "*have a responsibility to commercialize, but they do little and do less well than minying enterprises*". Another employee from the same company shared her colleagues' enthusiasm, stating that the government is "insisting" on supporting commercial space, providing policy backing alongside media support that promotes commercial space as a major innovation driver through reports and conferences, further boosting encouragement. "*More and more people are coming; private enterprises are the most important for the development of the sector*". While these statements are quite enthusiastic and should be examined with caution, they do reflect significant optimism about the sector's future.

Employees of Private Launcher Company 5 (exchange no. 26) indicated that the central government should approach this from an economic opportunity perspective: CASC and CASIC offer high prices, while commercial companies provide more cost-effective resources. According to them, the development of Guowang aims to test both private and state-owned enterprises.

Employees at the booth of an SOE-related institute, where half of the exhibit was dedicated to commercial space, confirmed (exchange no. 24): "*Commercialization is a priority; it is a major trend still under development. Before this, companies focused on the plan*". They also mentioned the military-to-civil integration process [军转民 *junzhuanmin*].

b. *An Initial Role of the Central State Role to Relativize*

As seen in Chapters III and IV, while central government policies are highly visible and cannot be openly challenged, they remain vague, detached from concrete realities on the ground, and weakly binding.

The literature describes a fragmented policy and regulatory framework riddled with loopholes and lacking enforcement mechanisms[389]. The numerous entities involved are difficult to identify in terms of authority, a situation summarized by the expression "*nine dragons control the river* [九龙治水 *Jiulong zhi shui*]".

[389] Gao, "An Analysis of the Domestic Legal Situation Based upon the Legislation of China's Space Law [woguo hangtian fali fasuo yituo de guonei falv huanjing fenxi] 我国航天法立法所依托的国内法律环境分析."

A law instructor from an University of Political Sciences and Law (exchange no. 6) acknowledged that, within this confusion, the interests of private enterprises—lacking representation in decision-making bodies—would be particularly underrepresented. Specifically, no dedicated institution oversees commercial space. However, the absence of a legal framework, particularly a space law draft [草案 *cao'an*] reportedly proposed as early as 1997, does not hinder state-owned enterprises (SOEs), as their operations rely on internal procedures: "*Traditional space does not need a law to thrive*".

An employee from Private Launcher Company 1 (exchange no. 3) initially stated that the policies applied equally across entities but then reconsidered, acknowledging that SOEs were *"perhaps slightly advantaged institutionally*". He cited the example of launch sites, where the Key Performance Index (KPI) included success rates—effectively making private companies' test launches less attractive. Performance evaluation criteria were reportedly modified recently to address this issue.

Several interviews highlighted the ambiguity of early policy texts. An SOE executive (exchange no. 2) remarked: *"The [2014 Guiding Opinions] was very macro; launchers were not included, so companies decided to pursue them on their own".* Another source stated, *"The government sought to encourage the market, not necessarily private initiatives themselves"* (exchange no. 4). Similarly, an employee from Private Launcher Company 1 (exchange no. 3) explained: *"We didn't know what could or couldn't be done—it was unclear. We needed authorization from many people... Then, local governments started clarifying things more and more".*

The same employee noted that the central government's stance on personnel transfers from SOEs to private enterprises was initially unclear. He indicated that only after the first employee left CASC for the private sector—and with the publication of a *notice* in 2014 (likely confused with the 2014 *Guiding Opinions*)—was this practice deemed permissible. Before this, *"minying enterprises could not participate at all,"* but local governments gradually began encouraging it more explicitly.

Regarding the division of roles between national and local policies, most interviewees agreed that the central government would set general directions, while provincial governments refined them. These policies often include territorial incentives for space enterprises, such as tax breaks, subsidized or donated office space, industrial park incubators, and access to infrastructure.

In an exchange with the co-founder of Private Launcher Company 3 (exchange no. 9), he stated: *"The government provides general direction; it may encourage or not. It sets the 'tone and form' [定调定型 dingdiao dingxing]"*. Local governments operate based on their agendas and can choose whether to support certain enterprises.

c. *Provincial Governments: a Key Link*

The relationship between enterprises and provincial governments appears rather transactional. Each party leverages its advantages and pursues its own interests in negociating conditions. For enterprises, the goal is to secure preferential treatment, access to favorable ecosystems, and key infrastructure. Meanwhile, provinces compete against each other (exchange no. 3), striving to stand out in evaluations by developing innovative activities endorsed by central authorities. One interviewee emphasized that "*cumulative impact*" [综合作用 *zonghe zuoyong*] forms the basis of interprovincial competition. By that turn of phrase, he may have referred to the combined influence of various factors, such as local regulations, support for private enterprises, access to industrial parks, tax incentives, and broader governmental strategies.

According to an executive from CAS-Related Satellite Company (exchange no. 1), more than 20 provinces were promoting commercial space in 2023 (out of 23 total, which may be an exaggeration). He described the process as *blindly driven* [盲目 *mangmu*]: *"The central government promotes it, so provinces follow suit. Everyone does it, if they don't, they feel left behind. But we need to see the real results; maybe it will generate losses"*.

A researcher specializing in commercial space working at a CAS-affiliated research laboratory (exchange no. 16) described provincial policies as a mixed blessing: "*Their goal is to nurture the industry, but they lack a panoramic vision; the framework differs from province to province, from city to city"*. He cited Hainan's focus on launches and Hunan's emphasis on CubeSats, echoing a CAS-Affiliated Launcher Company employee's remark (exchange no. 14) that "*each province has its own commercial space sector*" and an employee at Private Launcher Company 4's comment (exchange no. 13) that "*all provinces have created space cities*".

An employee of a Foreign Space Agency who co-authored a report on China's commercial space sector (exchange no. 30) observed that the commercial space ecosystem in China is highly dynamic. Its macro-level approach is to *"feed everywhere to get the champions of future industry to emerge."*

As in 2023, multiple interviewees within companies noted that the national regulatory framework had little impact on their activities—or that they were unaware of it. This phenomenon, previously identified in the IDA report[390], further relativizes the importance of policies. More radically, the co-founder of Private Launcher Company 3 (exchange no. 27) argued that as long as the definition of space remained unclear, public policies in this area were useless. The previous year, he had already advocated abandoning the term *"commercial space",* which he deemed too ambiguous, in favor of *"private space"* (exchange no. 9).

The designation of commercial space as a *strategic emerging industry* may reinforce provincial efforts, though it risks speculative excesses and redundant investments. As a CAS researcher commented on Beidou application industrial parks:

"The publication of the Medium- and Long-Term National Satellite Navigation Industry Development Plan triggered a wave of Beidou industrial park construction across China. However, according to a specialized local survey, less than half of the 40 planned parks were completed and put into operation. Only after an initial phase of uncontrolled expansion did genuine Beidou industrial parks 'reveal their true form' [露出了马脚 *luchu majiao*]"[391]

4. Difficulties

a. *Finding a Financial Model in an Oversaturated Market*

Several interviews highlighted the long-term ambition of private and CAS-affiliated mixed ownership companies to go public (exchanges nos. 14, 15, 28). An interview with an employee at Private Launcher Company 4 (exchange no. 28) provided insights into this challenge: while going public would grant access to secondary investment markets, various obstacles remain, including the impact of economic slowdown on investment bodies and government-imposed constraints on profitability and success rates. The policies in place were described as general and poorly suited to the space sector, in part due to fears of financial fraud. However, the interviewee remained optimistic that the regulatory framework might improve in the future.

[390] Irina Liu et al., "Evaluation of China's Commercial Space Sector."
[391] Tao Feng, Chang Lei, "Beidou Reaches the Sky, the Space Industry Is in Full Bloom [北斗升天 导航产业风正盛]," *Beijing Business Today 北京商报*, August 6, 2020, https://baijiahao.baidu.com/s?id=1670346527891838751&wfr=spider&for=pc.

Two other interviewees painted a bleaker picture, expressing concerns over the long-term viability of their businesses given the national economic downturn, leading to a strategic shift in their activities. This was particularly evident in the cases of CAS-Related Satellite Company and Private Launcher Company 3 (exchanges nos. 17, 27). The intense competition at the national level was emphasized by a CAS-Affiliated Satellite Company executive (exchange no. 17), who described an accelerating selection process: *"There were too many companies before, surviving solely on investors".* He also pointed to a lack of orders and the need for companies to self-finance. However, he noted that his company was adapting well, pivoting towards component sales rather than full satellites, with an increase in revenue.

Private Launcher Company 3, on the other hand, was facing significant difficulties (exchange no. 27). Running out of revenue, the company reportedly shifted to providing testing services for CASC's methane-powered launchers.

The reliance of commercial space companies on external financing was also highlighted in other interviews (exchanges nos. 1, 26). Employees of Private Launcher Company 5 (exchange no. 26) noted that one of their main challenges was securing funding: *"Since we are not state-funded, we need to turn to external investors."* Of their 300 employees, 80 were dedicated to investor relations. Private Launcher Company 2 employees (exchange no. 8) similarly mentioned having a *"special team for convincing investors."*

These concerns echoed predictions made by an SOE executive in 2023 (exchange no. 2), who was *"quite pessimistic about the future of commercial space".* He estimated that there were 25 commercial launch companies (likely an overestimate for launchers alone), but expected only *"maybe three"* to survive long-term. He highlighted not only the technical difficulty of passing orbit but also the challenge of securing customers. "*You need both the technology and the industrial capacity* [技术产业都要 *jishu chanye dou yao*]".

The same SOE executive suggested that while the technological threshold for satellites was somewhat lower, the market itself was extremely tough, with very few end-users. *"Taking a few pictures isn't enough. It's easy to take pictures, yet taking useful ones is much harder".*

Two interviewees (exchanges nos. 15, 22) emphasized that the success or failure of a single launch could impact the entire commercial space industry. A senior consultant specialized on the issue (exchange no. 15) remarked: *"Landspace has brought victory to everyone with its success."* She also noted that the economic downturn in China had affected all sectors,

including space. Conversely, an employee at Private Launcher Company 5 pointed out that *"if one company fails, the whole industry suffers",* particularly due to the rising cost of insurance (exchange no. 22).

b. *Shifting to Military Exports*

Two interviewees mentioned the possibilities of reorienting toward international markets as their companies were faced with an oversaturated domestic market, particularly for military-related exports. Yet, another nterviewee from a launcher company pointed out the risks of exporting military technology to *"dodgy countries"*, citing Israel, Yemen, and the Middle East. He also noted the geopolitical risks: *"[These exports] are dangerous because the United States is the world's police."* This statement reflects concerns over potential U.S. sanctions, which were also mentioned in an interview with another employee at a private launcher company: *"Companies must survive. The domestic market is already highly involuted [内卷 nei juan]."*

Another executive from a private company described a shift in focus toward international markets using the phrase "*Going Out* [向外走 *xiang wai zou*]*",* mentioning potential clients in Pakistan and even France. He also asked me to promote dual-use technology products within my network.[392]

The domestic military remains a key target customer for commercial space companies (exchanges nos. 2, 5, 8, 26). However, as an employee at Private Launcher Company 4 pointed out (exchange no. 28), the current technological level of commercial launch companies is not yet sufficient for significant military contracts. In this regard, a CAS researcher specializing in commercial space explained that he himself avoids military-related research due to its sensitivity, but acknowledged that *"this actor will always be present"* through funding, launch sites, research units, and more (exchange no. 16). The essential role of the military was also highlighted by the founder of Private Launcher Company 3 (exchange no. 9).

[392] Given the sensitivity of the information, the identification of the exchanges has been fully erased for these two paragraphs.

a. *The Challenge of Launch Infrastructure*

Several interviews pointed to the lack of available launch pads as a major bottleneck for commercial launch companies (exchanges nos. 22, 26, 28, 30). A representative from a Foreign Space Agency (exchange no. 30) succinctly stated: *"The bottleneck is launching pads".*

An employee at Private Launcher Company 5 explained that 38 days had elapsed between two test flights of their reusable vehicle. When asked whether this delay was planned or imposed, the interviewee confirmed that it was imposed due to authorization, oversight, and control procedures at the Jiuquan launch center. Given the positive outcome of the test, the company was preparing for another launch with a shorter turnaround time.

The imminent opening of a new commercial launch pad in Hainan and the increasing use of the Oriental Space Port by OrienSpace and Galactic Energy indicate a diversification of available launch infrastructure. An employee interviewed at Private Launcher Company 1 noted that launches from Shandong province were simpler, with fewer restrictions, shorter wait times, and launch costs up to *"twice as cheap".* Employees at Private Launcher Company 23 (exchange no. 8) highlighted its own dedicated launch pad at Jiuquan, built between 2020 and 2022 under a "*self-investment, state-supervised*" model [自己投资国家监督 *ziji touzi guojia jiandu*].

An employee at Private Launcher Company 4 (exchange no. 25) also emphasized the lack of launch pads as a limitation and noted that some companies were in the process of building their own. For example, Ceres-1 could be launched from a mobile truck, while the Pallas rocket was designed for launches from both Hainan and Taiyuan. In this context, the Hainan spaceport is being partially developed for commercial launches, making access easier from a procedural standpoint. The Taiyuan launch site, though less commonly used by commercial companies, could offer shorter wait times.

b. *Sustainability of the Commercial Space Enterprises Business Model*

When asked about the long-term viability of commercial space companies in China, the Foreign Space Agency representative stated that shifting focus to component production would not be a viable alternative: *"It is harder to supply one [compatible] subsystem than to integrate a full system".*

These structural challenges: economic pressure, dependence on external investors, lack of orders, infrastructure constraints, and the competition-driven shakeout, suggest that only a

handful of companies will survive in the long term. The ongoing development of commercial launch facilities and new business strategies such as military exports and international partnerships indicate that adaptability will be key to sustainability in China's evolving commercial space sector.

Another interview with an employee of Private Launcher Company 4 (exchange no. 28) highlights that OrienSpace's engine was bought, as was that of Space Pioneer. During exchanges at Orienspace[393], an employee specified that the technologies used "*are not so new*" and that most components were purchased. Conversely, Orienspace would innovate in planning and assembly to be as efficient as possible. They would also be exploring other models, including marketing partnerships. Their revenues would currently be sufficient. Their launcher, with a higher capacity than other launchers, could also launch other items, such as cars.

This functioning was described by a member of a Foreign Space Agency who has worked on China's commercial space sector (exchange no. 30) as primarily a financing strategy: according to him, "*it is better to achieve at the nearest point*", meaning relying on solid propulsion to secure funding after initial successful launches. Additionally, there is a strategy of drastically reducing costs, particularly by staying close to the launch site. Thus, OrienSpace would be more cost-efficient than Landspace due to its proximity to the launch pad.

An employee of Private Launcher Company 4 (exchange no. 13) also mentions "*aggressive marketing*" on the part of OrienSpace. This comment may be linked, for example, to their decision to conduct a sea launch from a barge, which resulted in particularly striking images. This approach is reminiscent of the criticism made by Shen Nian, discussed in Chapter II of this dissertation: "*dazzling with spectacle*"[394]. Here, this strategy serves to attract funding, which is absolutely crucial for a late entrant in an increasingly saturated market.

An employee of Private Launcher Company 2 (exchange no. 8) specified that companies without in-house engine manufacturing capabilities could purchase them, mentioning OrienSpace, Space Pioneer, and CAS Space. While the suppliers of these engines were initially SOEs, today they can also be commercial companies.

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[393] As some information is enterprise specific and anonymization would rende rit unintelligible, the choice was made to keep the name of the enterprise and erase the identification for the exchange.

[394] Shen, "Rediscussing 'Commercial Space' [zaiyi 'shangyehangtian'] 再议'商业航天.'"

An employee of iSpace, clarified that many elements of their launchers were developed in-house: “the internal development rate is very high [自己研发比率很高 *ziji yanfa bili gui hen gao*]”: the centralized control system [金控计算机核心处理 *jinkong jisuanji hexin chuli*], the onboard computer, and the engine. Other parts were produced by subcontractors but were based on in-house designs. The employee considered that the company's strength lies in its technologies.

Exchanges highlighted that iSpace have an assembly line in Beijing, which would set them apart from other companies. For “*practical and developmental reasons*” they would need to be closer to their headquarters. Serial production was planned for the end of 2024. Other in-house developments include reusable vehicle systems as well as critical electrical and electronic systems for the launcher [电气主要设备 *dianqi zhuyao shebei*]. The price per kilogram for launch is estimated at around 100-200 kRMB (13-26 kEUR).

An employee of SOE Spin-Off Launcher Company specifies that some parts are produced using 3D printing, which would be 35% faster to manufacture.

Exchanges with employees at Galaxy Space highlights that their main clients are for observation satellites, including CGSTL, Spacety, and Zero G Lab, and explained that the company's advantage whould lie in its low cost and reliability. With 11 successful launches, they were the first to reach an industrial-level launch cadence, “*mass production* [批量 *piliang*]” Demand for satellites is indeed high, but there is little supply capable of offering rapid launch capabilities: “*We can fill this demand because we are fast”.* However, the launch capacity of SOEs is reportedly insufficient. Solid propulsion was presented at the beginning of the interview as being more responsive than liquid solutions.

Additionally, an interview was conducted with a marketing employee at Private Launcher Company 4 (exchange no. 29), highlighting other aspect of the company's activities. According to her, marketing through advertising partnerships represents the very essence of commercial space and concerns “*everyone*”, which can be understood as all commercial companies, possibly including state-owned enterprises. In this context, the case of Taikong Chuangxiang, a brand established by CASC for cross-industry partnerships, was mentioned. This brand was present at the last two CSCs via a booth selling a wide range of derivative products, particularly for children (plush toys, keychains, stickers, stationery); but also, for a broader audience of enthusiasts (T-shirts, scarves, figurines).

It is interesting to note how the Private Launcher Company 4 employee presents the value of these marketing partnerships, which echoes this dissertation's conclusion regarding the role of commercial space in changing the use of space more broadly: "The objective of these partnerships is to make space more visible." She cites a partnership with a local government, a bank, a jewelry brand, a brand of trending snail noodle soup [螺蛳粉 *luosifen*], and a public awareness campaign on autism. This last point could highlight a perceived obligation for private companies to engage in charitable initiatives and present themselves as "*responsible*" enterprises, a turn of phrase which echoes the content of 2022 *White Paper* calling for the cultivation of "*visionary entrepreneurs with a sense of social responsibility*".[395]

According to her, the marketing activity does not generate much profit but adds to the perceived price of the launch service. It would also help establish a brand culture [品牌文化 *pingpai wenhua*]. In other *minying* launch companies, it would involve small teams: one person at Landspace, none at OrienSpace, a statement that somewhat contradicts the idea of aggressive marketing by the latter company as mentioned by her colleague (exchange no. 13).

c. *Megaconstellations Projects*

In their public communications (WeChat, conferences), private commercial launch companies and CAS Space have announced their intention to enter the megaconstellation market. The question of private companies' participation in the national megaconstellation *China Satnet*, sometimes referred to as *Guowang* or *Guoxingwang*, remained open during the first field research in 2023. A senior worker at a specialized Consultancy Company (exchange no. 5) had presented it as a crucial issue for the sector's future.

A law law instructor at a University of Political Sciences and Law noted that the project was mainly closed off due to international competition: *"Guowang has become a question of national security, so it cannot be given to an international enterprise. As long as you are not in these limits, it is good."* (exchange no. 6).

As of May 2024, the national megaconstellation was still considered a sensitive topic (exchange no. 18) and showed no clear signs of rapid progress. However, a report from China Central State Television (CCTV) announced the involvement of commercial space actors, including

[395] State Council Information Office, White Paper: China's Space Activities in 2021 [《2021 中国的航天》白皮书 2021 zhongguo de hangtian baipishu]; "China's Space Program: A 2021 Perspective - Official Translation."

both private and mixed enterprises, in the *China Satnet* project. Aside from one rather affirmative response (exchange no. 26), discussions on-site were inconclusive. An employee at Private Launcher Company 4 (exchange no. 28) emphasized that before participating, launch companies would first have to first demonstrate sufficient payload capacity, a high launch frequency, and a strong reliability rate.

In addition to *China Satnet*, two new megaconstellation projects have emerged that are not under central government control: *G60* and *Hongqing*. The first, based in Shanghai, has generated significant interest and led several private launch companies, including LandSpace, to establish new offices in the port city (exchange no. 18).

The emergence of these new projects within a single year highlights the extreme fluidity of China's megaconstellation landscape. Initially of little interest to policymakers—who likely viewed them as speculative bubbles in the mid-2010s—megaconstellations had initially been the subject of two state-owned enterprise (SOE) projects, one led by CASC and the other by CASIC, alongside numerous private initiatives. In April 2021, the State-Owned Assets Supervision and Administration Commission (SASAC) announced the creation of a single company, placed hierarchically above both SOEs, abruptly halting all other initiatives in favor of *China Satnet* alone.

According to one exchange, the use of *Starlink* during the Russia-Ukraine conflict motivated the creation of a centralized project, which was then classified as a national security priority. Another discussion indicated that this shift had negatively impacted satellite industry development.[396]

Chapter Conclusion

As demonstrated in this chapter, the composite nature of the commercial space sector in terms of enterprises is beyond doubt for the industry actors interviewed. In particular, a distinction is made between subsidiaries of state-owned enterprises and *minying* companies, whose statuses are clearly distinct. CAS Space appears to occupy a position of its own, benefiting from certain advantages associated with state-owned enterprises while being in genuine competition with private companies.

[396] Due to the sensitivity of the topic, these specific exchanges have been deliberately left unidentified.

Relations between the different types of enterprises—particularly between *minying* companies and state-owned enterprises—are complex. The latter may have resisted the emergence of a private sector, potentially perceived as a long-term threat, but supplier relationships do exist, mostly flowing from SOEs to commercial companies, though, in some cases, also in the other direction. In any case, a more proactive encouragement from central authorities in favor of commercial space reduces the margin of maneuver available to state-owned enterprises to block the rise of private firms. As suspected in Chapter II, SOEs may have adopted a strategy of "playing the market card," notably by claiming leadership in commercial space while effectively excluding private companies.

The role of the central government in the early phase of commercial space development, around 2015–2019, should be put into perspective. It was experienced by field actors as a period of generalized uncertainty, now giving way to clearer support, which is consistent with the findings of Part 2 where policy approach at the time was identified as exploratory. Local governments play a more concrete role in implementation, offering privileged conditions or access to coveted resources (talent, ecosystems, infrastructure); the relationships between them and the private and mixed-ownership companies interviewed are transactional in nature.

Companies report facing a series of structural difficulties: an overcrowded supply side, uneven access to funding, and bottlenecks around launch infrastructure. Mega-constellation projects are often cited as the most promising prospect for sustained demand, though their viability remains to be demonstrated.

Ultimately, the evolution of China's commercial launch sector is best described as composite and uneven. It reflects no unified master plan but rather a partially spontaneous dynamic, shaped by speculative initiatives—particularly at the provincial level—and characterized by a bottom-up entrepreneurialism that coexists with institutional inertia and competitive asymmetry.

VIII. Chapter VIII – Study of WeChat Communication for Commercial Space Launch Enterprises: the Shape of Corporate Identities

In the previous Part 2, we categorized a selection of 13 commercial space launch enterprises into three main groups based on their capitalistic structure and to discuss their differences. 10 enterprises consist of private startups, including LinkSpace, LandSpace, SpaceTrek, OneSpace, iSpace, Deep Blue Aerospace, Galactic Energy, OrienSpace, Space Pioneer, and RocketPi. ExPace and China Long March Rocket, are spin offs of State-Owned Enterprises, respectively CASIC, and CASC. CAS Space, is a mixed ownership spin off to the state Chinese Academy of Science.

In this chapter VIII, we focus on the official WeChat account publications of some of these enterprises, which were monitored over six months (July–December 2023). The objective is to characterize the communication strategies of these enterprises on WeChat, particularly to assess whether the differences observed in their capital structures—quantitative in nature—are also reflected in their discourse, which involves more qualitative elements. Hence, the typology of enterprises serves as a lens through which we analyze their communication strategies on WeChat, assessing whether capital structure correlates with specific communication patterns.

The *minying* or private enterprises are presented first (Chapter VIII.A.). Next, we examine ExPace, which presents a stark contrast in the type, format, and tone of its WeChat publications compared to *minying* enterprises studied (Chapter VIII.B.). Finally, the publications of CAS Space are analyzed, which share similarities with the publications of *minying* enterprises, making it the closest to them in terms of communication style, but also with ExPace, while presenting some distinct features of its own (Chapter VIII.C.). This order of presentation is justified by clarity and practicity reasons.

Analysis of online public messaging will enrich the existing typology of enterprises, which has been gaining consensus in the literature[397], with necessary qualitative elements. Indeed, a number of interviews and field observations presenter in the previous Chapter VIII pointed out

[397] Liu et al., "Evaluation of China's Commercial Space Sector"; Walsh, Christensen, and Ronci, "Lost Without Translation - Identifying Gaps in U.S. Perceptions of the Chinese Commercial Space Sector"; Han et al., "A PIE Analysis of China's Commercial Space Development"; Lucie Sénéchal-Perrouault, "Chinese Commercial Space Launchers: Historical Perspective; Policy Framework," *Space Policy* 66 (November 1, 2023): 101572, https://doi.org/10.1016/j.spacepol.2023.101572.

differences between various types of enterprises that extend beyond the scope of mere financing, touching ultimately on corporate culture and history.

Additionally, the quantitative data accessed to in Part 4 of this dissertation also present a number of limitations. As was said in the interview with an analyst in a specialized think tank, the data they rely on are rather an estimated valuation of the enterprises, which they obtain directly from internal sources, whereas publicly available data such as the investment to subscribed capital "*do not mean much*" (interview no. 3).

These elements, which have not been explored in previous literature, are crucial for understanding the phenomenon of commercial space in China as a pluralistic reality. Analyzing the online communication of these enterprises allows us to identify differences in corporate culture and hypothesize about their causes. This analysis places commercial launch enterprises within their historical context and links the findings of Part 1 of this dissertation, which focused on specialized literature.

Main Findings

The analysis of data retrieved on WeChat tends to complement the results of the quantitative research presented in Part 2 of this dissertation. The different types of enterprises identified in the literature and applied to a selection of commercial launcher companies exhibit not only financial characteristics but also discursive ones, which hint at differences in corporate culture, justified by their market positioning and historical background.

Private companies, which rely on external funding, are characterized in their communication on the social network WeChat by a focus on technological content that highlights their progress in testing and launch trials. Operating with limited resources, they also publish less content than their SOE spin-off counterparts studied here.

ExPace is distinguished by a high volume of posts, in which the near-total absence of content focused on technology is notable. The most frequently identified post categories concern the staging of work teams and internal meetings, with a strong presence—explicit or implicit—of the Chinese Communist Party. It would appear that ExPace's WeChat publications are primarily intended for internal corporate use, though they may also serve a recruitment function. A "propagandistic style," spanning across all published posts, has been identified, notably marked by references to the company's history. ExPace may be attempting to position itself

within a historical legitimacy reaching back to the early days of China's space program under Mao Zedong—something that is not observed in *minying* companies.

CAS Space exhibits hybrid characteristics in its communication, echoing the findings of qualitative data collection. The company communicates extensively on its technological progress, tests, and launches. As established in Chapter V, it is indeed in competition with private companies in terms of the technological maturity of its launcher—an assessment confirmed in the interviews of Chapter VII—and it is partially funded by private capital, as discussed in Chapter VI, all of which could explain this transparency. CAS Space also draws, though more occasionally, on historical elements, referencing the role of its parent laboratory in the early stages of space activity.

A. Gathering Data on WeChat

The decision to focus on posts published on official WeChat accounts is grounded in methodological considerations. These accounts provide a rich, structured, and widely accessible source of content, ensuring a consistent and comparable dataset across the enterprises analyzed. Given WeChat's role as a primary corporate communication platform in China, its systematic study offers a valuable perspective for examining differences in discourse strategies among commercial space enterprises.

Although WeChat is theoretically accessible to all, it remains largely underutilized by non-Sinophone researchers. The rarity of research on the platform exemplifies problems caused by the decoupling of digital ecosystems in research, reinforcing the divide between internet users within the People's Republic of China, who operate within the constraints of the Great Firewall, and those outside it.

Beyond accessibility concerns, the use of WeChat for research presents several methodological challenges compared to data retrieved from indexed websites. Account creation can pose technical difficulties, such as mandatory mobile phone verification. Navigating the interface, although partially available in translation, still requires adaptation, particularly for what concerns the identification of sources. More significantly, conducting searches and verifying sources is particularly challenging, as the platform does not support automated translation of search results, making it difficult to systematically locate, extract, and validate relevant content from reliable sources.

This chapter also incorporates insights from field interviews. Chronologically, the WeChat account study corresponds to the period following the first field investigation in April–May 2024, which was discussed in previous Chapter VII of this dissertation.

Some companies are not analyzed in this chapter. First, China Long March Rocket. As noted in Part 4, China Long March Rocket is not included in official listings of enterprises in Chinese sources, and its inclusion in this research came at a later stage. Therefore, it was not part of the study at the time of the WeChat analysis. Second, LinkSpace and OneSpace were inactive on WeChat during the study period, preventing their inclusion in this research**.**

a. *WeChat Presentation: the Most Widely Used Social Platform in the PRC*

WeChat is a Chinese social media platform owned by Tencent. While its primary function as an instant messaging service makes it comparable to WhatsApp, its "Friend Circle" (朋友圈) function is similar to the newsfeed features of X and Facebook.

The user interface allows viewing posts in chronological order from the most recent to the oldest, enabling users to scroll through content. Users can see posts from personal contacts and subscribe to official accounts of news outlets or institutions, which are displayed separately.

For this study, the posts from the official accounts of the selected enterprises were followed over six months (July-December 2023). The titles, content, and hyperlinks of these posts were gathered in a database to observe and compare the regularity of posting, identify categories of posts, analyze the written and visual content.

b. *Relevance*

WeChat is a dominant communication platform in China, and its widespread use makes it a prime venue for studying the online public discourses of the enterprises in this case study, all of which actively use it but LinkSpace and OneSpace (although both enterprises have an account, they made no publication over the study period).

The information published by these enterprises on WeChat in the form of posts provides a significant mass of data for observations and analysis. The nature of posts as texts accompanied by images makes them relevant material for qualitative analysis. WeChat serves as a regular source of corporate communication from the enterprises themselves, within a public arena. Posts on WeChat allow for the identification of recurring elements in the discourse of these enterprises, including topics, phrases, and visual styles. They also provide insights into technological developments through posts about tests and launches.

WeChat official accounts contain regular, up-to-date content. While webpages are static, WeChat is a Web 2.0 social media, platform characterized by user-generated content.

c. *Limits*

As a tool of public relation, WeChat official accounts of enterprises will essentially broadcast content that are at the advantage of enterprises and cast a positive light on them. As illustrated

by interview with a founder of one of such enterprise (exchange no. 9), it is rare to communicate on failures. While procuring abundant and up-to date articles, they also only publish “politically correct” discourses on a public media that is also subject to censorship.

Due to limits of time and relative importance of the subpart of this chapter in regard to the entire dissertation, the choice was made to focus on Wechat, but Weibo and QQ accounts which are other popular social medias are a lead for further research. The choice was made to favor WeChat for two reasons: one is the relative difficulty of access to the platform for non-Chinese readers, the other is the fact that WeChat represents the expression of the enterprises themselves, which allows to combine this data gathering with the content of the interviews.

B. General Observations

In order to characterize the official WeChat communication of the selected enterprises and, more specifically, to determine whether differences on this platform align with differences in financial data identified Chapter 4 of this dissertation, both the content and format of the articles published on their official accounts is analyzed. A typology has been elaborated, tagging posts in different categories based on content themes such as technical updates, recruitment, outreach, and internal activities. These categories allow for structured comparisons between different types of enterprises. These main categories serve as a framework for organizing observations and identifying key characteristics of the WeChat communication strategies employed by the selected enterprises.

Let us begin with a general analysis of the distribution of posts across different categories for each type of enterprise. In the following subsections, the scope of the main post categories for each Type of enterprise is examined in greater detail.

The following table presents the distribution of post types among private enterprises.

Category of posts	**Number**	**Average per active account**
Test	34	4,6
National holidays	33	4,1
Launch related	25	3,1
Outreach	15	1,9
Recruitment	9	1,1
Award	9	
Analysis	6	
Business agreement	6	
News Relay	4	
Interview	3	
Marketing partnerships	3	
Internal meeting	2	
New Model Announcement	2	
Total	151	18,9

Test-related content is the most frequent category (34) among private enterprises. These articles primarily highlight recent tests conducted on launch vehicles or individual components. Often

accompanied by images and/or videos, they serve both an informational and promotional function, showcasing technical advancements and innovative capacity. What characterizes the communication of private enterprises is a focus on updating the public about the technological advances made by the company.

National Holiday posts represent the second most common category for private enterprises. While present across the WeChat communication of all types of enterprises studied, their relative importance varies significantly among private enterprises. While all enterprise types publish a similar absolute number of such posts (around 3–4 per company), they account for 21.8% of private enterprise posts, compared to only 3.56% for ExPace and 5.6% for CAS Space. This highlights the difference in total posting volume between private and SOE-affiliated enterprises.

Setting aside the *National Holidays* category, the communication of *minying* enterprises primarily revolves around progress in research, development, and the implementation of their services. This stands in stark contrast to the communication strategy of ExPace, as illustrated below.

However, certain categories are common across enterprise types, particularly *Outreac*h and *Recruitment*, which account for a significant number of posts. All the enterprises studied use WeChat to report on their participation in trade fairs and other external events. They also leverage the platform as a tool for recruitment efforts.

The distribution of ExPace's posts on WeChat over the study period is as follows:

Category of posts	**Number of posts**
Staging the workforce	34
Internal meeting	31
Outreach	11
History	6
Launch related	5
External Meeting	5
Certification	4
National Holiday	4
Recruitment	3
News Relay	3

Interview	2
Marketing	2
External Internal	1
Advertisement	1
Award	1
Technical article	1
Test	1
Total	115

The posts published on ExPace's official WeChat account have been categorized into different groups, with the two most prominent being workforce-related posts (34) and internal meetings-related posts (31).

The *Staging the Workforce* category consists of vividly narrated articles that portray workers both in text and images. While some of these articles may touch on testing activities, they do not provide any technical details. Additionally, all machinery in the accompanying images is systematically blurred. This type of content is entirely absent from the communication strategies of private enterprises.

The *Internal Meetings* category includes posts about organizational meetings and training sessions, particularly those related to Party activities, both within ExPace and at CASIC. These posts emphasize ExPace's position within a state-owned group.

Thus, the predominant categories of posts published by ExPace suggest that its WeChat communication is primarily internally oriented, serving as a tool for team cohesion and ideological reinforcement, which stands in stark contrast to the communication strategies of *minying* enterprises.

CAS Space's official WeChat posts over the study period were organized as follows.

Category of posts	**Number of posts**
Outreach	23
Human Resources	8
Launch related	7
Meeting	6
Business Agreement	5

Interview	5
Test	5
Award	5
Factory	4
Holiday	3
Publication	2
Recruitment	1
Total	74

CAS Space's public communication on the social network WeChat is characterized by the significant presence of outreach activities, with a third of the posts published by the mixed enterprise falling into this category.

The specificity of CAS Space is the importance of interactions with the public, and the sometimes very advanced scientific and technical nature of these exchanges. Overall, CAS Space gives the impression of being very involved in exchanges with the outside world in the broad sense, and in communication and popularization of science in particular.

The presence of articles falling under the category of *Human* Resources, that also feature the workforce and *Internal Meetings* should be noted, but in a much lower proportion and showing important differences in content and style from ExPace, hence the choice of a different name for the category. The publication of the tests is in an absolute quantity and format comparable to that of private enterprises. CAS SPACE therefore presents categories of articles present at ExPace and absent in private companies, and vice versa.

CAS Space presents a hybrid communication strategy, incorporating elements found in both private enterprises and SOEs. While ExPace's messaging is largely inward-facing, emphasizing ideological cohesion, CAS Space adopts a more outward-oriented approach, focusing on public engagement and scientific outreach. CAS Space also adopts practices typical of private enterprises, particularly in communicating over its scientific advancements.

C. Characterizing Private Enterprises WeChat Communication

Over the study period, 9 private enterprises were active on their WeChat official accounts: Landspace; SpaceTrek; iSpace; DBA; Galactic Energy; Space Pioneer; OrienSpace; RocketPi. The enterprises studied that were not active on WeChat over the study period were LinkSpace and Onespace.

The repartition in the number of posts published among private enterprises is as follows:

Name	Deep Blue Aerospace	Galactic Energy	iSpace	Landspace	OrienSpace	RocketPi	Space Pioneer	Space Trek
Total	21	29	12	19	26	21	13	10

For private enterprises, I organized posts in the following categories.

Category of posts	Number	Average per active account
Test	34	4,6
National holidays	33	4,1
Launch related	25	3,1
Outreach	15	1,9
Recruitment	9	1,1
Award	9	
Analysis	6	
Business agreement	6	
News Relay	4	
Interview	3	
Marketing partnerships	3	
Internal meeting	2	
New Model Announcement	2	
Total	151	18,9

Detailed repartition among enterprises is as follows:

Name	Deep Blue Aerospace	Galactic Energy	iSpace	Landspace	OrienSpace	RocketPi	Space Pioneer	Space Trek
Test	9	3	5	1	12	2	2	
Holiday	4	2	4	3	4	8	4	4
Launch related	1	15	1	5			3	
Outreach	2			1	6	4		2
Recruitment	1	2	1	1	1		1	2
Award	2	1		1		3	2	
Analysis		1	1	4				
Agreement	1	3			2			
News Relay	1			1		1		1
Interview					1	2		
Marketing		2		1				
Internal meeting						1		1
New Model Announcement				1			1	
Total	21	29	12	19	26	21	13	10

a. *Technological Tests at the Forefront*

The first category to stand out among publications of commercial private space enterprises is *Test*.

Below are four translated examples of posts classified under the test category. Screenshots of these articles are included as an Annex F. to provide a visual representation of the posts, particularly highlighting the prominent role of images.

These posts have been fully translated to offer the reader an authentic insight into the content and style of WeChat communications from private commercial space enterprises, an aspect not yet explored in existing literature.

Articles in the *Test* category present tests carried out by companies on launchers or launcher components. The text of the articles is centered around the technologies: identification of the parts tested and their technical characterization, the innovative and/or beneficial nature of the technological solution chosen; details of the stakes involved in the test; place in the launcher's development progress and/or in the test sequence, etc.

RocketPi:

"*The "Shannon" rocket motor, developed by RocketPi, adopts the liquid-oxygen methane technology path with electric turbopump. Compared with the traditional technological path, the electric turbopump engine abandons the mechanical structure in its design and adopts "electrification" and "low cost". The mechanical parts of the original subsystem, such as the gas generator and secondary valve, are replaced by an electric motor and valve. Thanks to this optimization, the motor's operating principle has been simplified, the number of components considerably reduced and the overall weight significantly lowered.[…]*

Ultra-low-temperature, high-speed, high-power-density electric motor equipment is one of the core technologies of the electric-pump turbocharged motor, RocketPi has taken the decisive step of making the motor capable of maintaining high speed and torque output in a deep cold 77K environment through continuous technical research. The successful application of a new cooling method enables a breakthrough in power density in a very low-temperature environment, improves the stability of the motor's electrical equipment thanks to an algorithm, successfully solves the problem of unreliable power devices, and guarantees the reliability and performance of the entire system.

At present, RocketPi has mastered the technology of an 80 kW class motor, with a speed of up to 35,000 rpm, which can operate normally in a very low-temperature environment (-190~60)℃, and a power density of up to 9.1 kW/kg, ranking it first in China. This indicator is in a leading position in the country. This technological breakthrough laid a solid and reliable foundation for subsequent engine and rocket research and development, and ushered in a new chapter in the technological development of China's high-thrust electric pump booster engines."[398]

iSpace:

"*At 2:00 pm on November 2, 2023, iSpace's Hyperbola-2 reusable demonstration rocket (code name SQX-2Y) was fired and lifted off from the Jiuquan Satellite Launch Center. Approximately*

[398] RocketPi, "Breakthrough R&D Progress on RocketPie's 80 kW Shannon Motor 火箭派'香农号'火箭发动机80kW 级电机研发取得突破进展," 微信公众平台, accessed December 5, 2023, http://mp.weixin.qq.com/s?__biz=MzkxNDE4MTI1NQ==&mid=2247495474&idx=1&sn=99241aea51137ab32db69a888d3b4f7b&chksm=c170f2daf6077bcc9c77b541ba92cafa7a7e8629e3ac6897af769460e391cdf4637ff9378a73#rd.

one minute later, the rocket landed smoothly and accurately on the target landing point, the rocket's condition was safely restored, and the flight test mission was a complete success.

The SQX-2Y rocket that carried out this mission is a verification model used to check the vertical recovery and reuse of a reusable liquid methane oxygen (LOM) launcher stage. The rocket has a diameter of 3.35 m, an overall length of around 17 m, and is equipped with the Jiaodian-1 variable thrust liquid oxygen-methane engine (codename JD-1) developed independently by iSpace. With a test flight altitude of 178.42 m, a flight duration of 50.82 s, a landing position accuracy of approx. 1.68 m, a landing speed of 0.025 m/s, a landing attitude angle of approx. 0.18° and a roll angle of approx. 4°, the flight test mission was completed with a high degree of accuracy.

This flight test verified the validity of the overall design of one stage of the Ipace reusable liquid rocket, the validity of the design of the continuously variable thrust liquid oxygen methane propulsion system, the validity of the rocket's navigation, guidance and landing section control system for its vertical landing, the validity and coordination of the rocket's liquid oxygen methane filling, launch, recovery and reprocessing processes, verify the function and performance of the rocket's landing gear damping and support, and achieve a successful, high-precision flight test mission. Essential test data for the rocket's key liquid oxygen and methane reusability technology have been obtained, providing solid technical support for the development of the SQX-3, the company's medium-to-large reusable launch vehicle.

The complete success of the ISpace Hyperbola-2 verification rocket mission marked a major breakthrough for China's commercial aerospace industry in reusable launch vehicle technology, and also sounded the alarm for China's aerospace industry catching up with the world's most advanced level in reusable launch vehicle technology. Charge horn! Come on, China's commercial aerospace industry! Come on, iSpace!" [399]

Deep Blue Aerospace:
"*Deep Blue Aerospace's independently developed Thunder-R1 reusable liquid engine recently completed its first 420-second long-distance test under nominal operating conditions. The*

[399] iSpace, "Interstellar Glory's Hyperbola-2 Rocket Verification Mission Is a Complete Success iSpace 星际荣耀双曲线二号验证火箭飞行任务取得圆满成功," 微信公众平台, February 11, 2023, http://mp.weixin.qq.com/s?__biz=MzU5NjQwNzI1NA==&mid=2247489766&idx=1&sn=cceb8ce9e447f32bcfab5cf9be080dc2&chksm=fe627e5fc915f749b5193c823ccfa04569bbf6d894f910ca331a4cc941f5b6ddc478eba4988a#rd.

duration of the test covered more than twice the flight time of the first stage of the Nebula-1 reusable launch vehicle. The engine started and stopped normally, and the whole process ran stably. The test was a complete success, marking the entry of the "Thunder-R1" in the system limit, lifetime and reliability test phase.

Thunder-R1 is a liquid engine specially developed for vertical recovery and reuse of launchers. It is currently demonstrating excellent performance in reuse, multiple starts and wide-range thrust control. 85% of the motor's weight is produced by 3D printing. It has a pumping motion and a compact structure. It is used as the main propulsion for the first and second stages of the Nebula-1 reusable liquid launcher.

To date, the cumulative duration of tests on the same engine has reached 2,000 seconds, verifying the anti-fatigue characteristics and service life of engine components in the engine's harsh working environment.

The engine's single ground ignition lasted 420 seconds. It assessed the coordination of remote operation, process reliability and margin design accuracy for the entire engine and each component. According to real-time monitoring throughout the test, the motor operates stably and in good working order. The test data conforms to the defined indicators, and all indicators meet the flight requirements of the "Nebula-1" rocket.

Long-distance test run is an indispensable and important link in the development, production and engineering application of a type of engine. The success of this long-distance test marks the rapid development of Deep Blue Aerospace's reusable liquid oxygen kerosene rocket engine, and also provides strong power support for the subsequent "Nebula-1" rocket to enter orbit.

Previously, the same "Thunder-R1" engine had performed tests such as the start-up and ignition test, the full machine test, the secondary start-up test and the three-start full flight sequence test. In future, we will continue to carry out ground test work such as a series of working conditions for deflection, oscillation, life and reliability tests for engineering applications. oscillation, life and reliability tests for engineering applications. The Thunder-R1

engine is the propulsion base for the Nebula-1 medium launcher, and will cover the needs of liquid rockets entering orbit and first-stage recovery. [400]

OrienSpace:

"*Gravity-1, OrienSpace's first launcher, will make its maiden flight in December 2023 at China's Oriental Space Port. Oriental Space has carried out various research and development work carefully and meticulously. The structural system recently completed the vibration test of the first-level and inter-stage core segments, which was a complete success.*

As we all know, a rocket needs a lot of thrust to fly into space. In addition, the collision with the airflow during supersonic flight will produce a large amount of vibration, which may cause equipment failure at least, or may cause serious accidents such as rocket explosions and losses. heavy.

Therefore, before the rocket is launched, it is necessary to pass a large number of vibration tests to verify the product adaptability. Conduct assessments. During the test, specified test conditions are applied to vibrate the rocket subsystems and components to assess whether the product can withstand the specified vibration conditions and work normally, expose weak links in product design or manufacturing, and ensure that the product works reliably and safely during rocket flight.

The test began with an autonomous vibration test of the gas cylinder of the gas tappet system at a pressure of 20MPa, which had already undergone the impact test of the separation test beforehand. During the test, the gas cylinder pressure remained stable, with no gas leakage or damage, proving that the low-cost gas cylinder solution can cope with the mechanical environment of vibration and shock on the rocket. After the vibration test, the gas cylinder, thrust flush device, piping, valves and cables were installed on the actual segment in accordance with the first flight condition, and the system was pressurized to nominal pressure to perform the system vibration test at the interstage segment of the rocket core. There was no pressure drop throughout the vibration process, proving that the gas flush system can cope with

[400] Deep Blue Aerospace, "420 Seconds! The First Long-Distance Test of Deep Blue Aerospace's Liquid Oxygen and Kerosene Engine Is a Complete Success!420 秒！深蓝航天液氧煤油发动机首次长程试车圆满成功！," 微信公众平台, October 23, 2023, http://mp.weixin.qq.com/s?__biz=Mzg3MDYyMDY5Mw==&mid=2247493307&idx=1&sn=f9f05753ccedf82d2c52cfdf9e7647c4&chksm=ce89adc1f9fe24d75e9c9e84a271ce0556bfa369be2fd8ff845576a17153ee072ea1f25ae43a#rd.

the rocket's vibration environment, and the cables were reliably attached without loosening, so the test was a complete success." [401]

As the screenshots in Annex F. show, a striking amount of illustrations accompany the texts, be they images and videos they contain in addition to the video. The capabilities of the launcher-parts are explained in a distinct and clear manner, with fairly precise technical specifications.

The photos accompanying these posts occasionally present blurred elements, presumably as safeguards for the protection of intellectual property and industrial secrets. Notwithstanding these, they offer substantive insights into the developmental milestones and progress achieved in the maturation of launch platform models, particularly in comparison with posts from ExPace.

The relative openness of the enterprises' communication on their tests should not make us forget the nature of the articles as largely promotional. The tests carried out are always successful, a situation that was denounced in exchange no. 9; the company is presented as a leader in the sector; the limits of the technical solution chosen or the existence of competing technical solutions are not given etc.

Beyond advertising for the company, we can hint at a vulgarization, maybe educational desire. Some posts that are presented as belonging to a "series" of articles, such "upgrade on status closing to the [launch] date" [近期试验新动态]. Presenting these tests as a series could be a mean to better engage readers. They also help justify to existing investors the company's spending, and send a signal to potential investors or collaborators that the company is dynamic and making steady technical progress, which could be constitutive of the "brand image" evoked by Galactic Energy's marketing worker in interview.

The articles on technological testing, particularly at the end of the study period, emphasized the innovative nature of the solutions adopted, whether in terms of launcher architecture, materials or modeling techniques... The choice of these innovative solutions would create "challenges" and justify the need for testing. This way of presenting the tests is can be considered as a manner to create an engaging narrative for the reader.

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[401] OrienSpace, "First Flight Test - Gravity-1's Core Stage Vibration Test Has Been Successfully Completed! 首飞试验篇｜'引力-1 号'芯一级级间段振动试验圆满成功！," 微信公众平台, February 8, 2023, http://mp.weixin.qq.com/s?__biz=MzA3OTI5MDY3Nw==&mid=2247488081&idx=1&sn=fab4ee53a87a032a79eaa20265bd96dd&chksm=9fb49a0ba8c3131d2476660daca66d93aa3189ae9d0771e841d201737901b22cf5e8ee2d67b8#rd.

D. Characterizing ExPace WeChat Communication

The division of ExPace's WeChat publications into several discrete categories was not straightforward. Indeed, for a high number of posts, the central theme of the texts was not immediately obvious. While the titles of some articles suggested that they were primarily technological activity reports, the tone and content of the articles differed significantly from the *Tests* category found in private enterprises, as we will elaborate below.

After further study, I realized that the focal point for these posts turned out to be workers. Due to their distinctive, highly narrative style and the evident staging of their content, I opted to title this category *Staging the Workforce*. Following this, I added to this category articles that featured individual worker portraits as well as those covering group activities. The unifying element of this category is the figure of the worker, who holds an unprecedented place in ExPace's WeChat communication.

Another challenge in establishing categories for analyzing ExPace's WeChat posts was determining how to account for propaganda. Indeed, a significant number of posts evoked propaganda, either through the use of imagery specific to the regime, the incorporation of slogans and official discourse, or a mobilizing tone. Ultimately, the decision was made not to treat propaganda as a standalone category but rather as a theme and stylistic element that cuts across the various publication categories. This aspect is explored in the second analytical section of this chapter.

The second most significant category of posts on ExPace's official WeChat during the study period consists of reports on the company's *Internal Meetings*. Their prominence is also unique to the official communication of this SOE spin-off.

These two categories make it possible to capture the bulk of the company's published content by organizing it in a coherent way and proposing finer sub-categories, but also to introduce the distinctive character of ExPace's publications in relation to all other companies.

Category of posts	**Number of posts**
Staging the workforce	34
Internal meeting	31
Outreach	11
History	6

Launch related	5
External Meeting	5
Certification	4
National Holiday	4
Recruitment	3
News Relay	3
Interview	2
Marketing	2
External Internal	1
Advertisement	1
Award	1
Technical article	1
Test	1
Total	115

a. *Staging the workforce : a Reinterpretation of the Lei Feng Myth?*

The category in which the most articles published on the official WeChat account of ExPace were placed is called *Staging the Workforce*. This category is characterized by a strong focus on ExPace teams and employees. This focus is expressed through illustrative photographs in which they occupy the central place, quotes and first-person testimonies. We can subdivide this category into 3 main subcategories: articles featuring employees and teams at work; articles providing portraits of one or more employees including new recruits; articles presenting team building activities for teams.

A defining characteristic of *Workforce*-focused posts is their narrative style, which is significantly different from the *Test* category observed in minying enterprises. ExPace's posts are structured as detailed, emotionally charged stories rather than technical reports. They frequently center around a challenge—whether technical, logistical, or environmental—that is ultimately overcome through resilience, teamwork, and dedication. These posts use literary techniques such as dialogue, metaphors, and even poetic imagery. The tone of these posts is epic, sometimes borrowing from military vocabulary (fighting youth; organizing its own forces; assault team;) or metaphors (vast wilderness, breaking waves).

Technologies themselves play a secondary role in these narratives. Unlike private enterprise test reports, which highlight technical performance, ExPace's posts rarely provide concrete

technical details. As can be seen from the excerpts, the articles, which we can understand are in fact also about testing, research and development activities, do not include any concrete information on technologies. The vocabulary used is vague, focusing on the notion of integrated systems and processes with terms such as “project”, “segment”, “steps”, “nodes”. Instead, the focus is on the human element: employees’ perseverance, problem-solving, and team spirit. Photographs accompanying these posts reinforce this emphasis: workers occupy the center of the frame, while machinery and equipment are almost systematically blurred.

While many of these posts present themselves as technological activity reports, they present it through the lens of individual and collective effort rather than technical progress. The discussion of work ethic is particularly prominent, with strong emphasis on intergenerational mentorship, collaboration across departments, and fieldwork as key components of ExPace’s corporate identity. Employees are consistently portrayed as models of diligence, adaptability, and dedication to the company’s mission.

The articles seem to be intended to provide models to inspire and motivate readers, who are arguably before all internal to the company. The stories and the pictures make the articles relatable, highlighting the contributions of employees. They might be intended to foster a sense of organizational pride and encourage particular work ethics. All in all, 'employees at work' and 'portraits' of experienced staff can be seen as depictions of model workers in different formats.

Below are some excerpts of representative posts. Due to their length, I have chosen to present only selected passages.

“*As the old saying goes, the first day of the end of summer is still hot, like an Indian autumn. This time of the year does not seem to have mid-summer kind of arrogance and straightforwardness, but, with confident calm and perseverance, silently gathers momentum. At Kuaizhou launcher’s General Assembly and Coordination center, Control and Measurement Comprehensive Test Room, a team of young people called “project team for the test of a new model of Kuaizhou in the electrical control room” is launching a new round of tests. For them, the new model is not only a racing track to enlarge Kuaizhou rockets family and accelerate its extension to deep space, but also a vast wilderness for them to fully realize themselves and cash in on their values and ideals. A little less worry, a little more enthusiasm, this is the quintessence of youth, and also the belief of this team.*

"Ready on the flight control side!" this is the voice of brother Wei, responsible for the flight control software, coordinating the new round of testing. Brother Wei is the older brother in the room, undertaking multiple projects and multiple positions. In order to ensure that each project does not "fall behind" in their own segment, Brother Wei not only speed up his own segment based on technical experience, but also formulates a "balancing strategy" according to the specific circumstances of each segment ensuring the efficient development, balances development, simulation and testing time to ensure that each test to his part can be quickly. He balances the development, simulation and testing time to ensure that each test segment can be quickly combined, reducing the time for "picking up and passing the baton" making the newcomers run faster and smoother.

In order to ensure that the back wall of the manufacture segments do not fall, the young people also complement each other to enhance the overall speed of the team. "Hongfei, I need your help!" "Help me with this problem quickly, Hongfei!" ..... In the development of new models, small problems are inevitable, such "distress calls" happen many times every day in the test room, but there's often only one answer – "I'm coming!" Hongfei is the most experienced young man in the team. He is also the most enthusiastic and busy one in the face of the team's unexpected small problems, referred by his teammates as the "racing car repair division", he is always the first to accurately locate and solve the problem. […]"[402]

"*This is the time for collective wisdom, everyone's work and life experience are useful." says Ding Zihang, straightening the brim of his hat.*

This is Ding Zihang's third year in the company's power technology research room. He is currently responsible for the test site commissioning of a key technology verification test of the company. This verification test is the core step of a new model development project of the company and an important part of the opening of the "new route". It has high technical difficulty, involves complex elements, participates in many outsourcings, and has tight task nodes. For more than a year, the company has raised funds, organized its own forces, built a new test site, anchored its goals, and worked hard. It is about to enter the site.

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[402] ExPace - Electrical and Software Laboratory, "'Fighting Youth' Issue 1 | Electrical and Software Laboratory: A New Model Is Both a Racetrack and a Wild Expanse! 【战青春】第 1 期 | 电气与软件研究室：新型号，是赛道，也是旷野！," 微信公众平台, August 28, 2023, http://mp.weixin.qq.com/s?__biz=MzI2MjUyOTMyMg==&mid=2247499853&idx=1&sn=f696e11dd3462d11994af0600e22d087&chksm=ea4b4808dd3cc11ea28d0a8f346673f2db944e20f8437f1d8faf7b1d46aefd752c571da8b890#rd.

Ding Zihang introduced the staff on the site to the editor while trying to dust off the fresh loess on his body: "Knowing that you are coming today, I changed into a new one, but I didn't expect it to be dirty just now." After a shy smile, he quickly walked to the simple board house behind him to join the discussion team.

1 "Solve problems on site"

——Seniors take the lead

Accompanied by bumpy mountain roads and the cackling of geese, a few hours ago, Luo Ge and Liu Ge, who were in charge of the project, came back from other provinces and dragged their luggage to the remote test site without rest to deal with the debugging failure that occurred the day before. The first step when arriving at the site is to see the real object, and the second step is to go into the house to discuss.

[...]

"Solve problems on site, don't discuss them in the office." This was a clear requirement at the company's "fourth quarter sprint" mobilization meeting. At present, one team of the test is finishing the physical product test at the Kuaizhou Rocket Industrial Park nearly 100 kilometers away, and one team is debugging before entering the site at the self-built test site. Faced with new models, new technologies, new locations, and new equipment, the two teams are bound to have constant small problems. The two general system and technical leaders of the project are stationed on site for a long time to ensure that on-site problems are analyzed and solved on site in real time.

After checking the site with colleagues on site and personnel from external units, the fault was basically located. "We have been here for the past few days. If you have any confusion, just tell us and if you have any difficulties, just raise them." Brother Luo and Brother Liu gave everyone a "reassurance". Everyone then entered the temporary "meeting room and lounge" transformed from a simple board house. [...]

2 "The mission of the 'advance team' is to make the road smooth"

——Newcomers can take charge of their own affairs

At this time, another girl is walking from a distance with equipment in her hands. She is Yu Leqin, who had just joined the Electrical and Software Research Laboratory this year and is

responsible for software debugging. Following her into another "debugging room" that is also converted from a simple board house, the editor discovered that all the equipment here has been assembled by her alone. "These two desktop computers have just been transferred here. They will be mainly used by Ding Zihang in the future. He is in a meeting now. I will install them first," she says as she moves the table neatly and plugs in the wires.

Then, she turns to her small table and starts the intensive protocol debugging work with another outsourcing staff. It is reported that the work should have started in the morning, but due to the sudden power outage of the generator in the morning, it had to be delayed for half a day. "In a new test site, this kind of 'small situation' is normal. The task of our 'advance team' is to make the road smooth and eliminate these 'small situations'."[403]

"*Attention everyone, status check begins" "21 received" "31 received" "Power minus 10 hours ready"... After the "big snow" solar term, the temperature has sharply dropped, and the strong wind at the foot of the mountain rolled up the fallen leaves, setting off a golden vortex, [the view from] the window is in sharp contrast with the orderly equipment, team members, commands and fiery keyboard tapping of the technical area. The key technology verification test of a new model of ExPace has entered the final sprint period. Under the unified deployment of the company's party committee, the test team has established a "breaking waves and opening up roads" party member assault team. The two general systems of the test team serve as the commando leaders to lead all members to gather at the field test site, concentrate firepower to carry out multiple rounds of general inspection tests and drills, and make every effort to ensure the success of the final test. All difficulties are overcome, and work together to bravely break the waves for the opening of the "new route" of Kuaizhou.[…]*

"Why is it locked here?" In a round of general inspection tests, Song Lin's whispered muttering was instantly "magnified" in Li Xi's ears. Li Xi quickly alerted and told Wei Ge and Meng Ying in the same group. Judging from the perspective of Li Xi's team, although this situation does not affect this round of testing, it is very likely to affect the subsequent large-scale tests. At this time, the tests of other professional groups are still continuing. After a brief discussion, the

[403] ExPace - Party and Mass Work Department, "Opening Up a 'New Space Route' '新航路'的开辟," 微信公众平台, October 18, 2023, http://mp.weixin.qq.com/s?__biz=MzI2MjUyOTMyMg==&mid=2247501087&idx=1&sn=b43a3f938337193fa5e6d617904acce7&chksm=ea4b4d5add3cc44caaed1c4e9a69790f1bf60927f54be2337cdaabb061e0a41eb18ea953c96f#rd.

three decided to report to the two general systems. The two general systems quickly stopped the test and convened relevant professional discussions.[…]

No matter how strong the wind or how heavy the rain was, it could not shake the team members' determination to buckle every link and do every step correctly.

"I know, move a little more." "The problem turned out to be here." "Okay, it's OK, we are in good condition here." The "good news" from Chaowei in the technical area at the mountain came from the intercom. The problem is fundamentally solved, and everyone breaths a sigh of relief. In the rest room, the dispatcher Yanzhao had poured warm ginger cola for everyone, giving warmth to the team members who had traveled through wind and rain. [404]

The posts constituting portraits use this same focal length to present one or more workers. This type of post can concern qualified employees cited as examples or new recruits, accompanying an image of their testimonial. The importance attached to work ethic is reflected in the testimonials attributed to workers

"*It's been nearly three months since I started my career. [..] The motto of my alma mater, China University of Science and Technology, is "Red and Specialized, Fusion of Science and Reality", and I'm honored to be able to join the ExPace and use my own hard work to be a "red and specialized" screw in the motherland's aerospace industry. There was a joke in the Internet industry during the fall recruitment called "interviewing for building rockets and working for screws", but now I can proudly say that I am really building rockets. Aerospace is a serious business, and I am glad that I have met a group of united and loving colleagues in the information room, a master who teaches us everything, and a leader who cares for us, which makes me more enthusiastic about this noble cause. I will be practical and realistic in my future work and become a qualified young rocket! […]*

It's been nearly three months since I joined the company, and I'm very happy to be able to join this big family of Information Technology Research Laboratory, as I've gone from being at a loss at the beginning to being able to do things independently now, which is not only due to my

[404] ExPace - Party and Mass Work Department, "Forging the Sword . Decisive Victory: Fearless Against the Waves, Breaking New Route with One Heart Together"【铸剑·决胜】丨不畏巨浪勇劈波，齐心共闯新航路," 微信公众平台, December 14, 2023, http://mp.weixin.qq.com/s?__biz=MzI2MjUyOTMyMg==&mid=2247502339&idx=1&sn=da8d651357477d302ef5cbbd981895fb&chksm=ea4b4246dd3ccb5049da4ca6fe17100f46c6ffbcc712b92e931a0c8f700c059669f43da6cb07#rd.

own efforts, but also to the help of my colleagues. In the training, through the diversified courses and project learning, I not only gained professional knowledge and skills, but also enhanced the sense of teamwork and professional ethics. In my future work, I will utilize what I have learned, implement the professional quality improvement in practical work, and continuously improve myself to make positive contributions to the development of the unit and the prosperity of the aerospace industry."[405]

"*I am very happy and honored to be able to join ExPace and the warm family of the electrical room. The harmonious team atmosphere and the attentive care of the leaders and colleagues let me adapt to the new environment very quickly. Through more than a month of work and study, I deeply realize the importance of quality, confidentiality and safety, whether it is to write a report or do the test, we must strictly follow the norms and procedures, to maintain a strict, prudent, careful and practical work attitude. At this stage, there are still a lot of things I don't know, the master and the project team members in the technical advice and guidance so that I have to take a lot of detours, the surrounding colleagues have also given me a lot of help in other areas. In the future, I will try to improve myself and be on par with the excellent leaders and colleagues.*"[406]

"*Three months of job practice gave me two main feelings. The first is "attitude determines everything". Aerospace is a huge and complex cause. "Being able to endure hardships" and "willing to climb" are important contents of the aerospace spirit. We must not only use the "strict, careful and practical" work style to execute each link, but also face and solve every problem encountered in the work with the most optimistic spirit and the most positive thinking. The second is team spirit. Aerospace is a system engineering. Quality and efficiency are crucial to aerospace. This requires the unity of the team's "heart", "form" and "action". Only when*

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[405] ExPace - Information Technology Research Lab, "'I Am Proud to Make Rockets!' | [Information Technology Research Lab] Newcomer Says'干火箭，我自豪！'丨「信息技术研究室」新人说," 微信公众平台, September 10, 2023, http://mp.weixin.qq.com/s?__biz=MzI2MjUyOTMyMg==&mid=2247500884&idx=2&sn=7f6b54ba7351a3b6b4f4d08bb53ddcec&chksm=ea4b4c11dd3cc50771aea02b255f285f955784098130dc18994298281e61242e676a247db9d7#rd.

[406] Electric and Software Research Laboratory, "In a Good Team, Meet a More Brillant Self | [Electrical Software] Newcomers Say 在好的团队中遇见更优秀的自己丨「电气软件」新人说," 微信公众平台, September 20, 2023, http://mp.weixin.qq.com/s?__biz=MzI2MjUyOTMyMg==&mid=2247500228&idx=1&sn=08fdfc931f83ebbb79ed41e8804b1593&chksm=ea4b4981dd3cc097d438447bce3503fb17a2af9e64181c4a57c2671f81890283c2e129148769#rd.

everyone concentrates their hearts and minds can there be the highest execution and the best results. […]

At the same time, several months of professional experience have also made me deeply realize that aerospace is a cause that requires cooperation from all parties. The spirit of unity, hard work, pragmatism, self-reliance, reform and innovation of aerospace predecessors is the benchmark and driving force for every aerospace person to move forward. I hope that I can improve myself under the guidance of the spirit of my predecessors and become the backbone of the aerospace industry, a romantic and down-to-earth cause."[407]

Four posts related team building activities organized within the company, during the study period these included: integration activities; a "red" tourist outing; the organization of CASIC Olympiads. Here too, this type of post is an opportunity to promote certain attitudes on the part of workers.[408]

b. *Centrality of Meetings and Party Building*

The second category in which the largest number of articles on ExPace's WeChat account were grouped consists of minutes of internal company meetings. This category differs *Staging the Workforce* in that it primarily deals with the content of meetings that took place in recent times. The posts are generally more factual, shorter and less lively than those in the previous category.

Internal meetings reported on ExPace's official WeChat account include safety, quality inspections and other exchanges between the company and senior members of its parent branches, Sanjiang and CASIC. Other topics, such as training and mobilization, are discussed below.

The great importance in terms of the quantity of publication of posts relating to internal meetings on the official WeChat account of ExPace underlines the distinctive character of the

[407] ExPace - General Assembly and Adjustment Center, "To Be Broad and Meticulous | [General Assembly and Adjustment Center] Newcomers Say 致广大而尽精微丨「总装总调中心」新人说," 微信公众平台, October 10, 2023, http://mp.weixin.qq.com/s?__biz=MzI2MjUyOTMyMg==&mid=2247500954&idx=2&sn=17dfc7b585df5d725efbc569b09617c9&chksm=ea4b4cdfdd3cc5c91502fbbf025817dea9043f930bb1f3a7f1e1af78eb5ef0cc02e95211e0ff#rd.

[408] ExPace - Human Resources department, "Do Things for Unity and Success, and Be Upright People | 'Kuaizhou New Students' [Back to School Season], Full of Practical Information! 干团结争气事，做顶天立地人丨'快舟新生'「开学季」，干货满满！," 微信公众平台, August 20, 2023, https://mp.weixin.qq.com/s/5Yz3laYhOSy0Y2HKzznXQg.

company's position as a subsidiary of a state group. This position arguably makes it necessary to hold regular meetings to enable it to coordinate with the activities of the CASIC group on the one hand, and its home institute, the 4th Academic or Sanjiang, on the other. Finally, over the study period, a certain number of posts reported meetings on general mobilization in order to achieve the 2023 end-of-year objectives. This issue is present in other categories of articles, including those featuring the workforce mentioned above.

"*On the morning of July 26, Cha Xiongquan, Party Secretary and Chairman of the ExPace, presided over the company's 2023 second quarter Safety Production Committee video conference in Wuhan. Company leaders, department heads, and safety production management personnel participated in the meeting from Wuhan, Yangluo, and Yuan'an.*

At the meeting, Yu Feng, the company's Safety Production Director, conveyed the recent notifications and requirements from the Group Company and Aerospace Sanjiang regarding safety production work. Shu Mengjiong, Deputy Secretary of the Party Committee and General Manager of the company, urged all departments to resolutely implement the various decisions and deployments on safety production work from higher-level units. He emphasized the need to eliminate complacent thinking and lucky psychology, recognizing the extreme importance of ensuring safety production work. […]

On July 27, Cha Xiongquan led a team to conduct a special safety inspection at the company's Yangluo General Assembly and General Adjustment Center Park. The inspection focused on the high-voltage test area of the auxiliary workshop, the liquid nitrogen storage tank area, various hazardous points in the park, key fire protection areas, and the preparedness of the park's flood control emergency work.[…]"[409]

"*On the afternoon of September 13, Liu Zhouping, a member of the Group Company's Party Leadership Group and Deputy General Manager, and his delegation listened to reports on the progress of key tasks in the aerospace industry and the work related to the Kuaizhou series rockets in Wuhan. Leaders from relevant departments of the Group Company's headquarters, Liu Bo, Deputy Secretary of the Party Committee and General Manager of Aerospace Sanjiang,*

[409] ExPace - Technical security department, "ExPace Holds Second Quarter Safety Production Committee Meeting 火箭公司召开二季度安全生产委员会," 微信公众平台, July 29, 2023, http://mp.weixin.qq.com/s?__biz=MzI2MjUyOTMyMg==&mid=2247499398&idx=1&sn=a60828eaf90493c2f599b8f68565da73&chksm=ea4b76c3dd3cffd552c8e9a7ac2bacf45e316b5cce33ff5cf78b81fbe603286166bdda17cc45#rd.

Qian Wei, a member of the Party Committee and Deputy General Manager, attended the briefing. Leaders from relevant units such as the System Company and the Second Academy reported via video conference.

Regarding the promotion of follow-up work on key tasks in the aerospace industry, Liu Zhouping emphasized:

1. It is essential to deeply understand the significance of these tasks. All relevant units should unify their thoughts and actions and further improve work planning.

2. Systematic review is necessary, with strict and meticulous, tight and realistic approaches to identify and rectify problems promptly.

3. Strengthening quick response capabilities is crucial. With firm confidence and the resolve to overcome difficulties, we must ensure tasks are completed with quality and quantity.

4. It is critical to have a clear understanding of the severe and complex nature of the safety production situation, ensuring detailed and practical safety work, thoroughly investigating and addressing safety risks and hidden dangers, and firmly adhering to the principles of "no safety, no production; no safety, no testing; no safety, no transportation; no safety, no delivery."

5. Market promotion efforts should be enhanced. Focus should be on brand building, market marketing, and showcasing core competitive capabilities. Proactive planning and rapid response are necessary to continuously consolidate the influence of the commercial aerospace brand.

At the meeting, Liu Zhouping inquired in detail about the progress in developing the Kuaizhou series rockets and acknowledged the achievements of Aerospace Sanjiang's preliminary work. Liu Zhouping pointed out:

1. Great importance should be attached to the launch tasks of the Kuaizhou series rockets, with the goals of ensuring safety and success. Emphasis should be placed on stability, comprehensive control of processes, quality, and testing at all stages. Resource coordination and external collaboration should be strengthened to ensure smooth progress in all aspects of the work.

2. Systematic planning from the perspectives of resources and management is necessary to accelerate the iteration and capability enhancement of the Kuaizhou rockets, laying a foundation for further market expansion.

3. Efforts to enhance core competitiveness should be accelerated to support the high-quality development of the Group Company's commercial aerospace industry."[410]

[410] ExPace - Sanjiang, "Liu Zhouping Listens to Reports on Aerospace Industry Work in Wuhan Aerospace Sanjiang 刘著平在汉听取航天三江航天产业工作情况汇报," 微信公众平台, September 15, 2023, http://mp.weixin.qq.com/s?__biz=MzI2MjUyOTMyMg==&mid=2247500134&idx=1&sn=16e4b4ad9fb864f7def5b3a5671940fd&chksm=ea4b4923dd3cc035a470a8bc3f84fd660ac531f952de2083b9d6983971992e507ab1751ca8c3#rd.

E. Characterizing CAS Space WeChat Communication

CAS Space's public communication on the social network WeChat is characterized by the significant presence of reporting for *Outreach* activities, with about the third of the posts published by the mixed enterprise falling into this category. The specificity of CAS Space is the importance of interactions with the public, and the sometimes very advanced scientific and technical nature of these exchanges. Overall, CAS Space's official WeChat feed gives the impression of being a company very involved in exchanges with the outside world in the broad sense, and in communication and popularization of science in particular.

The presence of articles featuring the workforce and meetings should be noted, but in a much lower proportion and showing important differences in content and style from ExPace, justifying the choice of a different name for the categories: *Human Resources* and *Meetings*, most of the accounts for the latter being with external partners. The number of posts falling in the *Test* category is in an absolute quantity and format comparable to that of private enterprises. CAS Space therefore presents categories of articles present at ExPace and absent in private companies, and vice versa.

Category of posts	**Number of posts**
Outreach	23
Human resources	8
Launch related	7
Meeting	6
Business Agreement	5
Interview	5
Test	5
Award	5
Factory	4
Holiday	3
Publication	2
Recruitment	1
Total général	74

a. *Science Communication and Public Engagement*

The article category to appear the most at CAS Space is *Outreach* (23). Of all the enterprises studied, CAS Space is the one to recount the most interactions with the public. This type of post aims to promote the company to the outside world, whether through participation in industrial fairs and presentations (15); popularization among young audiences (7); plus one TV intervention. Technical presentations are a distinctive feature of CAS Space communication on WeChat. In addition, two articles put in another category of scientific publications reinforce the impression that importance is given to this type of communication.

Presence at science fairs, national and international, is mentioned in posts from all types of companies. CAS Space is nevertheless particularly active on this front, since 15 posts mention such activities. They include accounts of presence at fairs such as Guangdong-Hong Kong-Macao Greater Bay Area (Guangzhou) Venture Capital Summit[411]; China International Industrial Expo[412]; World Internet of Things Wuxi Summit[413].

Another subcategory for *Outreach* articles is accounts of presentation and speech reports. In the below, a great diversity of content and audiences reached can be noted. In the first example, the content is very technical, even academic. In the second, it is aimed at young people, and takes on a more ideological tone. In the third, whose format is reminiscent of a TedEx, the speaker participates in a day of awareness raising for the general public on the issues of science and innovation in various fields that go beyond space.

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411 CAS SPACE, "Dynamic News | CAS Space Invited to Attend the 2023 Guangdong-Hong Kong-Macao Greater Bay Area (Guangzhou) Venture Capital Summit and Give a Keynote Speech 动态资讯 | 中科宇航受邀出席 2023 粤港澳大湾区（广州）创投峰会并作主题分享," 微信公众平台, July 20, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247499009&idx=1&sn=e76056b5e88bddb6289906cde1626d93&chksm=c0266558f751ec4e1a8ba0da4768ef314e000bea818a800a616bc3f7852d2a6388b5f0826aa1#rd.

412 CAS SPACE, "Dynamic News | CAS Space Showcases the Li Jian Series of Launch Vehicles and More at the 23rd China International Industry Fair 动态资讯 | 中科宇航携力箭系列运载火箭等重磅亮相第二十三届中国国际工业博览会," 微信公众平台, September 26, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247507592&idx=1&sn=f53e61cd45d64cbe4ae6fcecdf2dcf9f&chksm=c02646d1f751cfc791e69006f007fef841eb7aa2dbd2bb5c9df77babaf42131e44c1f342a9ee#rd.

413 CAS SPACE, "Dynamic News | Discussing Rockets at Taihu! CAS Space Invited to Attend the Commercial Space Theme Salon at the 2023 World Internet of Things Wuxi Summit 动态资讯 | 太湖论'箭'！中科宇航受邀出席 2023 世界物联网无锡峰会商业航天主题沙龙," 微信公众平台, November 1, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247508935&idx=1&sn=b3023d9dfb1f444a4b7a4fb6b7d8c9f4&chksm=c0263b9ef751b2885f129b4cc14586607385c5edccac1bf025350207e23ad4fef34067016eb3#rd.

The level of technical detail of the content is striking, being incomparable with what is done for ExPace, and also exceeding the level of what private companies share. This state of affairs could be put in relation with to the nature of CAS Space as a spin-off of a state laboratory, with a vocation of public education and scientific popularization. The shared content could be identified with forms of teaching, which would go beyond the mission of posts from other companies, particularly private ones, presenting technical content: the latter are not intended to instruct the reader or listener, but fundamentally to position itself vis-à-vis the competition and to promote the technical solutions adopted.

"*On July 27, 2022, the "Li Jian-1" launch vehicle successfully completed its maiden flight, carrying the "Innovation X" series scientific experiment satellites into orbit. On July 27, 2023, marking the one-year anniversary of the "Li Jian-1" and "Innovation X" satellite launch, CAS Space and the Innovation Academy for Microsatellites of the Chinese Academy of Sciences held the "Innovation X First Satellite On-orbit Experiment Summary Meeting" in Shanghai. The event showcased significant scientific and technological achievements and jointly announced the "Innovation X Science Flight" plan. This initiative aims to establish a new paradigm for low-cost space science and new technology experiments, providing services to scientists worldwide. […]*

Using the LEIA payload, scientists successfully obtained real wide-field X-ray images and spectra of celestial bodies, marking the first time such wide-field X-ray focused imaging observations have been obtained and publicly released internationally. This achievement signifies that China has taken the lead in mastering X-ray lobster eye focused imaging technology, successfully achieving on-orbit verification and scientific detection application. On November 7, 2022, LEIA discovered an X-ray transient source (LXT221107A) and guided follow-up observations by NASA's space telescopes Swift and NICER. This transient source was later confirmed to be a super flare produced by the star HD 251108, with its flare luminosity and duration far exceeding those of typical stellar flares. On May 26, 2023, LEIA also captured the flare of the neutron star binary SAX J1747.0-2853 at the center of the Milky Way, with a resolution of 5 arcminutes, precisely determining the position of the binary and sparking intense research interest among astronomers worldwide. To date, LEIA has completed the first round of soft X-ray all-sky mapping, detecting multiple transient and flare sources, and conducting

in-orbit calibration testing and observation mode exploration, accumulating valuable data and experience for the upcoming launch of the Einstein Probe Satellite (EP). […]"[414]

"*On August 7, the Scientist Spirit Ideological and Political Course with the theme of "Dialogue with Science, Feel the Power of Innovation in the Bay Area" was successfully held at the CGN Daya Bay Nuclear Power Base in Shenzhen, Guangdong. Yang Yiqiang, Chairman and President of CAS SPACE, gave a speech as a representative of the Greater Bay Area's science and technology innovation entrepreneurs, telling the story of aerospace innovation and struggle, and interacting with young people.*

It is understood that this ideological and political course is a special open class for young people, co-organized by the China Association for Science and Technology, the Ministry of Education, the Ministry of Science and Technology, etc., and is one of the national series of scientific ethics and academic style construction propaganda and education activities, aiming to ignite the enthusiasm of young people for science and technology and stimulate innovation vitality.[…]"[415]

"*Recently, the 106th session of "Principles and Pathways" and the 2023 Haidian Science and Culture Lecture event was held at the Beijing Future Theatre. The event, themed "Bringing a Little Sweetness to the Brain," invited seven speakers from various fields such as aerospace, agriculture, healthcare, history, and psychology to share their insights and experiences. Over 500 audience members attended the event. As a representative of young aerospace scientists, Shi Xiaoning, Vice President of CAS Space, was invited to attend and deliver a keynote speech.*

"Principles and Pathways" is a science and culture forum created by the Chinese Academy of Sciences. It is co-hosted by the Computer Network Information Center and the Bureau of Science Communication of the Chinese Academy of Sciences, and organized by the China

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[414] CAS SPACE, "Dynamic News | One Year Anniversary of 'Kinetica' Maiden Launch, Scientific 'Innovation X' Put in Orbit and in Service 动态资讯 | '力箭'首飞一周年，'创新 X'科学航班上线," 微信公众平台, July 28, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247499951&idx=1&sn=cb0bbd10885d97c5eadfbc00824b1d79&chksm=c02658f6f751d1e02990bf8386aa06ba144a02a595a6161e6f1b359fae4fbb85af99b9680f79#rd.

[415] CAS SPACE, "Dynamic News | CAS Space Invited to Attend the 'Dialogue with Science, Experience the Innovative Power of the Bay Area' Ideological and Political Class with the Spirit of a Scientist, Sharing Stories of Aerospace Innovation and Struggle 动态资讯 | 中科宇航受邀出席'与科学对话，感受湾区创新力量'科学家精神思政课，讲述航天创新奋斗故事," 微信公众平台, August 8, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247503688&idx=1&sn=b25180b89b7ba791171d2c202ba53859&chksm=c0265711f751de079dd95fb59515cea6af49307b2d0c50ccf81bde47bfc37070d195a2b93546#rd.

Science Popularization Expo. The forum is dedicated to the interdisciplinary dissemination of elite ideas, encouraging elites from various fields to "view the development of other fields from an observer's perspective." It aims to hear perspectives such as the cultural arts through the eyes of scientists, technology and social economy through the eyes of artists, and education and life philosophy through the eyes of entrepreneurs. The goal is to allow thoughts to transcend industry boundaries, break down barriers between fields, achieve limitless collisions and exchanges, and inspire future innovation and development […]"[416]

It is worth noting the publication of two academic productions relayes on WeChat over the study period, a scientific article published in English in China Aerospace *Development Status and Main Application Progress of the Kinetica-1 Solid Launch Vehicle*[417], and a book *Reusable Rocket Structural Design and Digital Simulation*[418]. These publications clearly highlight a desire to communicate on scientific and technological issues on original academic media that are not used by other companies.

Part of CAS SPACE's outreach activities (7 posts) are aimed at children. Thus, 4 posts are intended for calls and results of drawing competitions[419]. Another post promotes a filmed

[416] CAS SPACE, "Dynamic News | CAS Space Invited to Attend the Chinese Academy of Sciences Science Culture Forum 'Principles and Pathways', Sharing the Story Behind the 'One Rocket, Multiple Satellites' Launch 动态资讯 | 中科宇航受邀出席中国科学院科学文化讲坛《格致论道》，讲述'一箭多星'飞天背后的故事," 微信公众平台, December 5, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247512830&idx=1&sn=55a0ec7eabc0cf5f608d0981a72255cc&chksm=c0262aa7f751a3b1d85d1e12cea420ef28269f40264a6bab65dd3b83f9e77bde23071e1058d0#rd.

[417] CAS SPACE, "Dynamic News | CAS Space R&D Team Publishes Paper in 'AEROSPACE CHINA' Journal 动态资讯 | 中科宇航研发团队在《AEROSPACE CHINA》期刊上发表论文," 微信公众平台, July 7, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247497868&idx=2&sn=394d503c800a9d17c2f4cfa0438ff3c6&chksm=c02660d5f751e9c386985c083b98a4b3949187e6916d1a950826d125df0e864ddb7805ceb4ea#rd.

[418] CAS SPACE, "Dynamic News | 'Reusable Rocket Structural Design and Digital Simulation': CAS Space Plans and Produces Academic Work in the Field of Reusable Rockets 动态资讯 |《可重复使用火箭结构设计与数字化仿真》：中科宇航策划出品可重复使用火箭领域学术著作," 微信公众平台, September 20, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247511341&idx=1&sn=f7543d2e93015072a8fa4015336e89ec&chksm=c0263574f751bc62416c7ad83ba28a102f8e17e6192cad81286ebe6e5c45a92e7584aa462306#rd.

[419] CAS SPACE, "Dynamic News | [Deadline July 25] Over 7,000 Submissions Collected! 2023 National Youth Aerospace Vehicle Design and Drawing Competition Artwork Review 动态资讯丨【7 月 25 日截止】已征集 7000 余份作品！2023 年全国青少年航天飞行器设计绘画大赛作品赏析," 微信公众平台, July 18, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247498973&idx=1&sn=11fa65835e1390d3ba63cb7238b8eeaf&chksm=c0266484f751ed92761ad2427b9faad36365412faaed6b1fd619f3daa083d8234c00d625e925#rd.

science popularization session aimed at children[420], another reports on an open day for employees' families[421].

b. *Human Resources: Engineers and Aspirations*

Over the study period, a certain number of posts published on CAS SPACE official WeChat account (8) fall under a category called *Human Resources*. The posts contained in this category illustrate both the common points and the differences that CAS SPACE's communication presents with ExPace's communication.

Indeed, the only presence of posts dedicated to the workforce is a common point with ExPace and a difference with private companies that did not publish comparable content, centered on the figure of employees, over the study period.

However, the posts grouped in the category *Human resources* present significant differences with those grouped in the category *Staging the Workforce* at ExPace. On the one hand, the number of articles is very different, both in absolute (8 versus 34) and in relative terms (10% versus nearly 30%). On the other hand, in terms of content and tone, CAS SPACE clearly differs from ExPace. In the portraits, that only ever deal with a single person, the accent is put on individual ingenuity, to which the corporate structure, proudly put forward as a "unicorn", young and innovative, gives free rein. Although we can again find the figure of the model employee who sacrifices him- or herself for the success of the launches, the testimonies seem less codified, richer in both personal and technical details, which can arguably make the articles attractive to an external readership, and is consistent with CAS Space's greater general openness about technological issues.

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[420] For example: CAS SPACE, "Dynamic News | Live Stream Preview: What Do You Want to Know About Rockets? Tune in to the Guangzhou Nansha District Aerospace Science Cloud Classroom 动态资讯 | 直播预告：关于火箭，你想知道什么？锁定广州市南沙区航天科普云课堂," 微信公众平台, September 20, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247507372&idx=1&sn=668219b2f6d4d2b2115e6a64d6558f32&chksm=c02645f5f751cce3b07d1f59e68595c0fc004ab60e5900a22be396c0f3d81b53098af5211563#rd.

[421] CAS SPACE, "Progress in the Development of the Kinetica 2 Liquid Launch Vehicle: Destructive Static Strength Test of the First Stage Liquid Oxygen Storage Tank Is a Complete Success 研制进展 | 力箭二号液体运载火箭（二）：一级液氧贮箱静力摸底破坏试验取得圆满成功," 微信公众平台, October 12, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247508254&idx=1&sn=ed25b5f49f3ce4c2d1498488de4dc01e&chksm=c0263947f751b05100ab8e1d3c3fcd35725298777bf27421474c55edf4486b06a1adeee6a099#rd.

Propaganda and communication relating to the Party, both modern and historical, is much more episodic and indirect in CAS SPACE WeChat communication than it is in ExPace where it has a central character. In posts relating to group activities, while one partly concerns "red tourism", the others make no mention of the party, in particular not of ideological training.

The portraits published on the official WeChat account of CAS SPACE form a series entitled *Young talk*. They more readily highlight young people, although the portrait of a senior employee was published during the study period[422]. Two of the four portraits were those of women[423]. These articles portray an employee by giving us details about their education, their motivations for entering the space industry, and their position in the team. A certain number of technical elements are given on this last point, as well as the staging of challenges to be met. Particularly highlighted is the autonomy they benefit from, which would allow them to fully realize their talents and innovate at the end of the article, elements are given on the personal and family life of the employees. However, although romanticized and staged, the tone seems freer than for the stories of ExPace, the stories are more diversified, less codified and seem more authentic.

"[…] *As the technical backbone of the structure system R&D team, Ming Aizhen is also the person in charge of the cold gas separation system of Power Arrow 1. She and her team pioneered the cold gas separation push-punch system, in which many key technologies were explored for the first time in China. Compared with traditional rockets that realize inter-stage separation through pyrotechnics, the Power Rocket 1 innovatively uses a high-thrust, non-polluting cold gas separation system, which is also used in the Power Rocket 1 Remote 2 Launch Vehicle this time*

[422] CAS SPACE, "Young Talk | Zhang Yanrui: 9 Years in Aerospace, Pursuing Rational Adventure and Relentless Innovation Young Talk | 张延瑞：航天 9 年，走在理性冒险、拼命创新的路上," 微信公众平台, December 7, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247512878&idx=1&sn=63aeef86135d9ed4dd2bb7596a98d97b&chksm=c0262b77f751a2613b6364c53e8722abbb7bbd038e03b772171b74dc9aed489e0df61ff9cf06#rd.

[423] CAS SPACE, "Young Talk | Ming Aizhen: A Representative of New Era Women in Aerospace, An Ambitious Professional Who Doesn't Want to Retire Young Talk | 明爱珍：新时代航天女性代表，不想退休的进取型选手," 微信公众平台, July 26, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247499773&idx=1&sn=8232a6a761c49229f3fc92da745df649&chksm=c02667a4f751eeb26efcd97aa7d948d3bada825684b2906847d3d4c11fade1379fd7b667fa3f#rd; CAS SPACE, "Young Talk | Zhang Zhijing: A 90s Rocket Designer and Her Many 'Firsts in Life' Young Talk | 张智境：90 后火箭设计师和她的 N 个「人生第一次」," 微信公众平台, August 29, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247506119&idx=1&sn=f7766622f8f00c00416a63418fc50a31&chksm=c026409ef751c988b47f09016d425ea9f127a6ce9f7aeb6e0d6e170aa6e0e1a15ac91d91673e#rd.

The cold gas push technology went through repeated changes and iterations, and for a month, Ming Aizhen held meetings with leaders at 4 p.m. every day to touch on the progress of the program. When the program entered the final stage, Ming Aizhen encountered new difficulties, "because it is a new product, there is no way to guarantee the reliability, and we need to demonstrate it through a large number of tests." When the team hesitated, the leadership stood up to give full support: "want to innovate is bound to be bold trial and error, do not be afraid to do the test, do ten times, do a hundred times are not afraid."

This time is full of torture and pain, but it is pain and happiness. Looking back on this process, she admits that her favorite part was the twilight when she and her team were struggling together, seeing the setting sun pouring in through the windows of the test room. […]

Ming Aizhen has a particularly acute sense of age, and the transition to 30+ hasn't changed her psyche; despite being the mother of a five-year-old, she still feels like "a little girl". Always young and vibrant, as she chooses to define herself with the color "red"[…]

Talking about the retirement life that young people aspire to, Ming Aizhen said with a smile that she did not envision the time after retirement, "I actually don't want to retire, I think the work is quite good, my work is my hobby. My husband's character is more outgoing, when he sees old people dancing in parks, he says "I want to do the same after retirement", I reply "You go by yourself, I do not go hahaha."[…]

UNESCO's June 2021 science report states that only 33 percent of the world's researchers are women, and only 4 percent of Nobel Prizes in science have been awarded to women. In the field of aerospace, female scientists are just as rare, and Ai-jin Minh is one of them. With her excellent quality of boldness and perseverance, she has taken risks, upgraded and fought monsters in the hardcore field of aerospace, contributing to social value and realizing self-worth at the same time.

As a woman scientist in the new era of aerospace, Ming Aizhen is meeting challenges and facing the future with unprecedented strength[…]."[424]

[424] CAS SPACE, "Young Talk | Ming Aizhen: A Representative of New Era Women in Aerospace, An Ambitious Professional Who Doesn't Want to Retire Young Talk | 明爱珍：新时代航天女性代表，不想退休的进取型选手."

"*Since the establishment of the Fifth Research Institute of the Ministry of National Defense (MND), the first missile and rocket research institute in China, China Aerospace has gone through 67 years of journey, during which the old generation of scientists have written too many legendary stories about greatness and dedication. Power Arrow 1 solid launch vehicle development is also the same, two consecutive successful launches behind, is the depths of the desert Gobi, a group of silent and steadfast astronauts for the development of the motherland's space industry day and night, and bravely broke out a "big rocket" development road, they deserve the word "great! They deserve the word "great".*

However, as the deputy chief engineer of the Power Arrow 1 launch vehicle, young space scientist Ma Yuhai does not want to label himself as "great": "I don't think there is anything in me that ordinary people should look up to, or something unattainable. I am just an ordinary person, a young engineer, contributing to society as much as I can, and what I have done is far from enough."

When he graduated with his master's degree, Ma finally had the opportunity to get an offer from the China Academy of Launch Vehicle Technology (CALT), where he worked on separation and overall design. After years of experience in the institute, Ma Yuhai refined his professional skills and gained a deeper understanding of the spirit of aerospace, the huge aerospace system, and the quality management system. This work experience led him into the field of rocketry and helped him accumulate valuable aerospace experience, but also left him with some regrets. As the time cycle of rocket development is as long as five or even ten years, when Ma Yuhai graduated and joined, the model development had already progressed for a long time. "So it's rather regrettable that I didn't have a complete experience of the whole process of a model from demonstration, design to manufacturing, and then to the success of the first flight in the institution."

2019 was a transformative year for Ma Yuhai's career, and in August of that year, when the Force Arrow 1 launch vehicle was still in the program demonstration stage, he joined CAS SPACE and was given the opportunity to calculate, demonstrate, and design a rocket by hand. "I was no longer a screw or component within a larger system; I needed to design a system myself, control the operating principles of the entire system, and influence the progress of the entire program."[…]

On June 7, 2023, when the Power Arrow 1 Remote 2 Launch Vehicle was launched, Ma Yuhai's role had changed from being the person in charge of the attitude control system to being the

person in charge of the entire flight control system, "probably from doing the design by my own hand to being a trainer." From the smallest personnel arrangement, the progress management of each specialty, the development process, to the coordination between the systems, and the whole model schedule matching, etc., all were handled by Ma Yuhai in a well-organized manner.

In the face of the rapid transformation of the role, Ma Yuhai frankly said he did not feel a "sense of panic", […] " With such a mentality, Ma Yuhai completed a successful leap in his role in the workplace at the age of 35. […]

Outside of work, Ma Yuhai likes to read books on history, society, and philosophy, from "A Brief History of Humanity" and "The Ideal State" to "Lectures on Modern Western Thought by Liu Keng", which made him start to think about management from a historical and philosophical point of view, why is it the way it is managed? Is there a better one? Has it ever happened in history? "If there are lessons to be learned that can be generalized from them, they can be applied to one's own management work."[425]

During the study period, 3 articles were posted reporting group activities. One of these posts reports a "red tourism" outing on the occasion of July 7[426] (the anniversary of the founding of the CPC). The other two articles do not make any particular reference to it[427]. Thus, in contrast

[425] CAS SPACE, "Young Talk | Ma Yuhai: From 0 to 1, Experiencing the Entire Lifecycle of Rocket Development Young Talk | 马玉海：从 0 到 1，经历火箭研制的整个生命周期," 微信公众平台, October 18, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247508734&idx=1&sn=2e7d41418a17bd8c337155c3c1057e36&chksm=c0263aa7f751b3b1d368fb99e8cdc664e34756fd78ccb8a09a426f5b7b6412356b6256d071d0#rd.

[426] CAS CAS SPACE, "Dynamic News | Uniting Hearts and Minds for the Future! Guangzhou Equipment Company Hosts 'Celebrating July 1st' Themed Team Building Event 动态资讯 | 凝心聚力，一起向未来！广州装备公司举办'庆七一'主题团建活动," 微信公众平台, July 1, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247497519&idx=1&sn=42b588852ce7a20cb93e80f4e8294d85&chksm=c0266f76f751e66038235f159e6e11c9f132cd4d2a84c699bb029fcb977e52b789797be72f4a#rd.

[427] CAS SPACE, "Dynamic News | Together We Excel, Welcoming Newcomers — CAS Space 2023 New Employee Orientation Successfully Concludes 动态资讯 | 聚而不凡 新生 we 来 —— 中科宇航 2023 年度新员工入职培训圆满收官," 微信公众平台, September 13, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247507093&idx=1&sn=bb735cbc37aed2f7cc71dde35f595bb3&chksm=c02644ccf751cddaba063983568cebfe6368ab54d99ab2f977403a6c5b29356ad99a962a04dd#rd; CAS SPACE, "Dynamic News | Dedicated and Deeply Cultivating, Building a Strong Foundation for Future Success! The First Phase of the Lv Hengju Skill Master Studio Training Concludes Successfully 动态资讯 | 潜心深耕，厚积薄发！吕恒聚技能大师工作室首期培训圆满收官," 微信公众平台, December 29, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247514394&idx=1&sn=bcc2b3ce8730016734ffd4d513da680a&chksm=c0262143f751a855f47f7f8e5fda60221c60112ced11b381187d8183d062d2ce54ba7fc1abf0#rd.

to ExPace where the party is omnipresent, particularly through numerous ideological training activities, its presence is more anecdotal and light at CAS SPACE.

Mentions of the history of space along with an epic tone were also found episodically.

"*In the afternoon of August 24, the new employees arrived at the China Aerospace Museum to visit the display contents of launch vehicles, missile weapons, deep space exploration, future prospects, etc., to gain a deeper understanding of China's aerospace scientific and technological achievements, to feel the development course of China's aerospace industry from scratch, from weak to strong, and to appreciate the aerospace spirit and culture nurtured in the process of more than 60 years of hard struggle.*

In the morning of the next day, the new employees went to the Institute of Mechanics of the Chinese Academy of Sciences to visit the Ultra-High-Speed Excitation Wind Tunnel Laboratory and appreciate the outstanding contributions made by the old generation of scientists for the development of China's wind tunnel technology. In the exhibition hall of the Power Arrow 1 launch vehicle, the new employees watched the overall structure of the rocket up close and understood the whole process of "Power Arrow 1" from research and development to production and manufacturing. The visit strengthened the new employees' determination to continue the spirit of science and contribute to the motherland's aerospace industry. […]

Mr. Yang Yiqiang, Chairman and President of CAS, and related leaders gave the new employees training on aerospace system engineering management and company culture concept. At the meeting site, Yang Yiqiang also sent a message to the new employees: "I hope you will love this platform, build this platform, cherish this platform, fight together, build CSC Aerospace into an international first-class aerospace enterprise, and grow up to be a better self on the way of the company's development and expansion."[428]

"*In order to study and implement the spirit of the 20th National Congress of the Communist Party of China, commemorate the revolutionary martyrs, and relive the red memory, on the occasion of the 102nd anniversary of the founding of the Party, CAS Space (Guangzhou) Equipment Industry Co., Ltd. organized a "Unite and work together to move towards the*

[428] CAS SPACE, "Dynamic News | Together We Excel, Welcoming Newcomers — CAS Space 2023 New Employee Orientation Successfully Concludes 动态资讯 | 聚而不凡 新生 we 来 —— 中科宇航 2023 年度新员工入职培训圆满收官."

future" July 1st Party Day themed team-building activity, and went to Huizhou Xunliao Bay and Humen Red Education Base for a two-day and one-night team-building trip.

On June 27, the team came to Xunliao Bay and started a wonderful seaside trip. Under the leadership of the coach, everyone was divided into 4 teams to play ice-breaking games. Blind square formations, acupressure board skipping relay races, magic pen Ma Liang, beach volleyball and other exciting activities allowed everyone to quickly integrate into the big family and work together to participate in the game.

The next morning's itinerary is to board the yacht and feel the sea up close along the beautiful coastline. Open your horizons, open your mind, feel the pleasure of the sea breeze, release stress and relax. Relive the years of war, walk into the Humen naval battle, and remember the heroes in the surging river. In order to give full play to the pioneering nature of party members and encourage everyone to actively move closer to the party organization, at the call of the party branch of Guangzhou Equipment Company, on the afternoon of June 28, all employees came to Humen Town, Dongguan City, and visited the Naval Battle Museum and Weiyuan Fort Ruins to receive patriotic education."[429]

c. *Meetings: External Engagements, Internal Coordination*

Concerning the posts dealing with meeting reports, it appears that the distribution of posts in subsections and the tone of the articles related to propaganda and the CPC is different in CAS Space publication on its official WeChat account compared to ExPace.

First of all, out of all the meetings reported in the posts on the official CAS Spacce WeChat account (6), there are only 3 internal meetings[430]. The other articles are more outward-looking,

[429] CAS SPACE, "Dynamic News | Uniting Hearts and Minds for the Future! Guangzhou Equipment Company Hosts 'Celebrating July 1st' Themed Team Building Event 动态资讯 | 凝心聚力，一起向未来！广州装备公司举办'庆七一'主题团建活动."

[430] CAS SPACE, "Dynamic News | CAS Holdings and CAS Capital Visit CAS Space Industrialization Base for Research and Guidance 动态资讯 | 国科控股与中科院资本一行莅临中科宇航产业化基地调研指导," 微信公众平台, July 14, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247498451&idx=1&sn=7aa9588bbb8ac72cf68e268f1fc6c9d2&chksm=c026628af751eb9c7eba24c67589ff8aa461ac1838dc2299244a53fc7e43dc6999cad62e512b#rd; CAS SPACE, "Dynamic News | Everyone Understands Fire Safety, Everyone Knows Emergency Response — Guangzhou Equipment Company Conducts 2023 Annual Fire Safety Education Activity 动态资讯 | 人人懂消防 个个会应急 —— 广州装备公司开展 2023 年度消防安全教育活动," 微信公众平台, September 1, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247506268&idx=1&sn=12179725d06726f3f1b5dd8527379160&chksm=c0264105f751c8136e0d9a15a7d35b20236b4e5cc5592ae309506dc3b5501cae9593436b8a93#rd; CAS SPACE, "Dynamic News | Riding the Waves and Sailing Together to Improve Efficiency and

whether they are visits by external delegations within the company (3)[431]; the visit to another company (Huawei) by a CAS SPACE delegation (1)[432].

d. *Technical Tests : Similar to Minying Communication*

The quantity of posts relating to tests (5), and their content is largely similar to what is found in the publications of private companies: focus on technologies, technical details, photographs and videos in support.

"*Recently, the Kinetica 2 liquid launcher tank using 5A06 material and with a diameter of 3,350mm successfully completed the static axial pressure resistance test. The test verified the feasibility of choosing the 5A06 material for the Kinetica 2 liquid launcher tank, as well as the rationality of choosing the cylinder shell structure.*

This test uses a 2000t self-balanced loading system to carry out the static axial pressure test, the upper and lower sections of the test part are connected to the test platform through the tooling delimitation, and loaded simultaneously by 16 rollers of 150 t. The accuracy of controlled loading is better than 1% of flight simulations, the self-balancing loading system and tooling constraints are used to ensure uniform loading of the part under test. This is a

Take the Lead — CAS Space Holds 2023 Mid-Year Work Summary Meeting 动态资讯 | 浪涌扬帆齐聚力 提效争先再起航 —— 中科宇航召开 2023 年上半年工作总结会," 微信公众平台, July 6, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247497589&idx=1&sn=7d8efd74e56269e4d390f9a283b57502&chksm=c0266f2cf751e63ad88e8e8e70d27c435875d895d02ff29d04a591c42a15d16d10e42a1defe7#rd.

[431] CAS SPACE, "Dynamic News | Director Chichebe Akachukwu of the Nigerian National Space Development Agency and His Delegation Visit CAS Space 动态资讯 | 尼日利亚国家航天发展局 Chichebe Akachukwu 主任一行到访中科宇航," 微信公众平台, July 12, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247498108&idx=1&sn=f1be9e806db644eba174cf4582ab5b6e&chksm=c0266125f751e833a458c9b9fff7f7a4eafb47c6322f09fc23955677a3b3c46a4d837fa50a3c#rd; CAS SPACE, "Dynamic News | Guangzhou University Party Secretary and President Wei Minghai and Delegation Visit CAS Space for Exchange and Research 动态资讯 | 广州大学党委书记、校长魏明海一行赴中科宇航交流调研," 微信公众平台, September 1, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247514189&idx=1&sn=f8e63a612cca9346811a441fa58aeca8&chksm=c0262014f751a9025fbb05cc93f17938ebd2f56255e3f4193a8a478dcd5836fe3eda202c5f4c#rd.

[432] CAS SPACE, "Dynamic News | CAS Space Chairman and President Yang Yiqiang and Team Visit Huawei for Process Informatization Practice Exchange with Huawei Manufacturing Corps 动态资讯 | 中科宇航董事长兼总裁杨毅强一行走进华为，与华为制造军团开展流程信息化实践交流," 微信公众平台, October 16, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247508327&idx=1&sn=fec502064906882c38ec394e93a3ca27&chksm=c026393ef751b028ca348416c3c28f2ebc7b482ac69f9d6a96660cc3c87003aa2a3771d12933#rd.

destructive test to determine the load limit of the storage tank, optimize the design and continuously improve the efficiency of the structure.

During the test, the displacement and deformation curves from the acquired data were good, consistent with the results predicted by the simulation before the test, without any anomalies, the destructive load of the test was consistent with the expected results, with a margin of error of less than 3.4%. This test made it possible to verify the feasibility of the selection of the 5A06 material for the storage tank of the Kinetica 2 launcher and of the structure of the envelope of the light cylinder, [it marks the virtual completion of this selection stage]. It took a total of 8 days from receipt of materials to completion of the test, which fully verified the rapid manufacturing characteristics of the storage tank"[433]

[433] CAS SPACE, "Progress in the Development of the Kinetica 2 Liquid Launch Vehicle: Destructive Static Strength Test of the First Stage Liquid Oxygen Storage Tank Is a Complete Success 研制进展 | 力箭二号液体运载火箭（二）：一级液氧贮箱静力摸底破坏试验取得圆满成功."

F. Hypotheses: Differences explained by Market Positioning and Corporate Culture

1. Reduced Transparency in Technical Communication for ExPace

a. *Observation - The absence of report on technical developments in WeChat publications*

The study of public online messaging of commercial space enterprises shows a marked difference in the way these enterprises communicate on technological matters. In this aspect, ExPace communicates significantly less compared to private enterprises and CAS Space. This is evidenced in the lack of technical content in their WeChat posts.

Private space entreprises and CAS Space have a comparatively more transparent fashion of communication on their technological activities, information about the advancement, future launchs etc are readily available. This is likely related to the fact that, contrary to SOE spin offs, they need to advertise in order to attract clients and investors. CAS Space generally shares detailed information on its testing, which is also consistent with its position in the market. The company has likely benefited from internal technology transfers but does not have a guaranteed order book, and its status as a traditional player in the Chinese space sector is different as CASC and CASIC.

Another hypothesis worth considering is that commercial enterprises and ExPace may have different corporate cultures regarding secrecy. As explained in Introduction, Chinese traditional space sector has a reputation for opacity, which aligns with our observations on the social media presence of CASIC's spin-off, ExPace. In contrast, such opacity is not observed in private enterprises' communication, as they stand apart from this culture.

This situation raises a fundamental epistemological question. The lack of sources and the general opacity of the space sector are often mentioned by English-language authors as obstacles to knowledge production on Chinese space activities. However, our field research and analysis of the social media presence of *minying* launch enterprises and one linked to CAS have revealed that collecting information about them is largely feasible.

The posts on ExPace's official WeChat account stand out from those of other companies in that they hardly address technical aspects at all. In contrast, private commercial space enterprises that were active on WeChat over the study period and CAS Space consistently released posts concerning their tests, often accompanied by illustrations, showcasing their testing procedures and progress.

During the six-month research period, ExPace was the most prolific WeChat official account in terms of the number of posts. However, the distinct characteristic of ExPace's posts is the near absence of concrete information pertaining to the technological development of Kuaizhou models. Only one article over 151 relates a test in a fashion comparable to the *Test* category identified for other enterprises active on WeChat over the study period. This is a single video, with no information other than the title[434]. If all companies active on WeChat have published at least one post on testing activities, including ExPace, the ratio of this type of article to the total published volume is much lower. A total of 16 articles were listed in the *Test* category for the 9 companies active on WeChat during the study period. For companies that were not active on Wechat during the study period (LinkSpace and OneSpace), such articles were found in previous periods. Private companies DeepBlue Aerospace (4 posts), OrienSpace (2 posts), iSpace (2 posts) and CAS Space (4 posts) published the maniest such articles[435]. Accompanied by photos and videos, they provide regular informations about the technical advancements of their models in fairly precise terms.

CAS Space, is closer to the communication of private commercial space enterprises, being one of the most prolific accounts in posting *Test* category of content.

As we have seen above, a significant portion of the content of ExPace's official WeChat were put in a category called *Staging the Workforce*. As can be seen in the selected excerpts, the articles highlight the workers, focusing on their moral qualities, notably their team spirit, resilience, and work ethic, rather than the technologies they work on. While their titles might suggest that they're about testing, their content and narrative are remarkably vague on these aspects and it is was not possible to identify what technologies are at stake. The accompanying images also illustrate this: unlike private enterprises and CAS Space, whose WeChat posts include photographs of launchers and tested components, in the case of ExPace, it is the workers who are at the center of the image, and the machines are most often blurred.

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[434] ExPace - Scientific Research and Technology Department, "The Full-System Long-Duration Hot Test of the Rocket Company's 70-Ton-Class Reusable Liquid Oxygen–Methane Engine Was Successfully Completed. 火箭公司 70 吨级可重复使用液氧甲烷发动机全系统长程热试车圆满成功," WeChat, November 4, 2023, https://mp.weixin.qq.com/s/VsjyLbhV_rhX-UCHZ-ASbQ.

[435] While LandSpace has not published *Test* posts over the study period, the official WeChat posted two indepth *Analysis*, which contain an important quantity of technical information. Space Trek did not publish *Test* articles either but this can also be put in relation with the low quantity of posts published over the study period (10).

b. *Hypothesis - Differences Explained by Different Market Positioning and Technological Maturity*

The hypothesis can be made that these differences are explained by the different market positioning and technological maturity shown in Part 4 of this dissertation. That is to say that private companies, and to a certain extent CAS Space, are more likely to publish about technical contents because of the need to inform their investors and attract new ones, as well as potential employees. At this stage, these enterprises depend on investment to sustain their activities, as their launchers are in qualification stage and not in a position to ensure a regular flow of revenue. In comparison, ExPace is a subsidiary form a SOE that benefits from State subsidies, as well as a mature model. It does not need to communicate as much on its technical advancements.

Overall, there are a number of reasons for private enterprises to present the results of their advancement in such a detailed manner:

Private commercial companies are accountable to their investors for their investments, and transparently provide clues as to heir technological advancement. The tested technologies are often presented as “breakthroughs”, and sometimes explained in a didactic way, which could be a way of attracting new investors. Articles about testing can be seen as a form of advertising about the substance of these companies' work, with its emphasis on technology and innovation.

In terms of final service, products, and regarding their technological advancements, private commercial enterprises are in competition with each other. Developing on their strengths helps to distinguish them from each other. Having such precise milestones can give the impression of a “race” between different companies.

ExPace, whose order book and financing are guaranteed by state institutions and whose launchers are by far the most mature, does not need to communicate as much as other companies for its survival. Further accentuating the divergence between these groups is the profound disparity in their technological progress presented in Chapter V. A case in point is the Kuaizhou launcher, which has successfully executed over 20 launches since its inaugural flight in 2013.

In contrast, remaining enterprises remain in varying stages of developmental progress.

CAS Space is in a special position: the successful launch of 26 satellites during Kinetica's 2nd flight suggests the presence of mature technologies, possibly developed in-house. CAS is a long-established institutional player in the space sector, with more advanced, publicly-funded

technologies and an established network. Nevertheless, it is also a "newcomer" to the commercial launcher market, and therefore in more direct competition with private commercial space companies than with SOEs with longer experience.

Thus, the observation of different enterprises' communication through their official WeChat accounts during the study period can be coherently articulated with the findings of Parts 3 and 4 of this dissertation through the following hypothesis. Private enterprises primarily communicate about the tests they conduct, which serve as a way to publicize their technologies, distinguish themselves from other companies, and demonstrate their progress in a competitive market where new entrants have multiplied rapidly since the mid-2010s. For these startups, communication on WeChat posts are relatively infrequent, possibly due to limited public relations and/or communication staff. In any case, their communication can be interpreted as focusing on the essentials, highlighting activities necessary for the survival of the company.

CAS Space, in absolute terms, publishes a comparable number of posts in the *Test* category relative to the most advanced private enterprises during the study period. However, the mixed-ownership company publishes nearly four times more than the average minying enterprises. As previously discussed, CAS Space's other main communications fall under the Outreach category, including a significant number of posts related to science popularization and technical communication. These posts reflect an identity unique to CAS Space, which may stem from its origins as a laboratory, one of whose missions is the dissemination of scientific knowledge.

ExPace, a state-owned spin-off, appears to deploy significantly greater resources for communication than other types of enterprises. The company publishes twice as much as CAS Space and more than eight times the average of private enterprises on WeChat. However, ExPace's communication does not focus on technical issues. Instead, what characterizes the majority of the retrieved posts across the board is the presence of what can be classified as propaganda, as discussed in the following subsection.

2. *The Presence of Propaganda: Overwhelming in ExPace, Discrete for CAS Space, Quasi Absent for Private Enterprises*

In this analysis, the term "propaganda" is used to refer to the systematic dissemination of ideological and political messages reinforcing Party legitimacy, and mobilizing individuals toward collective goals. In the case of ExPace, this includes notably explicit references to Xi

Jinping Thought and other political verbatim, the use of Party slogans, the glorification of model workers, and historical narratives that tie the company's mission to national achievements.

The place of propaganda in the posts published on the official WeChat account of ExPace, a distinctive feature of its communication with respect to all other companies, must be addressed separately. Indeed, although it was initially planned to make a category for articles presenting CCP propaganda content, I finally made the choice not to create such a category. This is not to say that ExPace posts over the study period do not contain strong political and/or ideological content: on the contrary, too many articles presented such content for a category grouping these articles to make sense.

Particularly telling regarding the omnipresence of propaganda are: the articles dealing with training, half of which (5 posts over 10) are dedicated to the directives of the Chinese Communist Party or to Xi's thought. On the other hand, certain articles in category *Staging the Workforce*, which we hypothesized above to deal with model workers, could be interpreted a modern re-exploitation of the Lei Feng myth, an idea that was hinted in an interview with a worker of a mixed-ownership CAS-related enterprise (exchange no. 14). They could help place the company in a glorious history whose origins date back to the Maoist period.

This transversal nature of the presence of propaganda and the place of the Party in ExPace's communications justifies separate treatment, especially since it is a unique characteristic of the company.

Both the importance of propaganda and its transversal character are hinted at by the origin of the posts. Posts published on the official ExPace WeChat account are attributed to a signature department. Among these, 37 come from the Department of Party and Mass Work, that is to say almost a third, but this signature is associated with a diversity of articles, the propaganda nature of which towards the Party is not always obvious. Conversely, a certain number of posts with clearly identifiable propaganda content are signed by other departments.

a. *Education*

"*On September 22, ExPace held a mobilization and deployment meeting for the theme education of learning and implementing Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era. Tong Jian, deputy leader of the group company's tour supervision team, and members of the supervision team attended the meeting for guidance. All the leaders of ExPace Party Committee at home, all middle-level cadres, party branch*

secretaries, etc. attended the meeting. The meeting was chaired by Shu Mengjiong, deputy secretary of the Party Committee, general manager, and deputy leader of the theme education leading group.

Shu Mengjiong conveyed the key points of General Secretary Xi Jinping's important speech at the Central Theme Education Work Conference, the spirit of the first batch summary and the second batch mobilization deployment meeting of the Central Theme Education, and the spirit of the first batch summary and second batch mobilization deployment meeting of the Group Company and Aerospace Sanjiang. Deputy Secretary of the Party Committee, Chief Accountant, and Deputy Leader of the Theme Education Leading Group Yang Junru briefly explained the 'Implementation Plan of ExPace on Carrying Out Theme Education on Studying and Implementing Xi Jinping's Thought on Socialism with Chinese Characteristics for a New Era. […]" [436]

"*On October 7, the ExPace Party Committee's Course on Study and Implementation of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era Theme Education opened. Cha Xiongquan, Secretary of the Party Committee, Chairman, and Leader of the Theme Education Leading Group of the Company, made a mobilization speech. Members of the Theoretical Study Center Group of ExPace Party Committee attended the opening ceremony.[…]*

In accordance with the requirements of the Central Committee and the thematic education work arrangements of the Group Company's Party Leadership Group and the Aerospace Sanjiang Party Committee, ExPace 's Party Committee thematic education study class will utilize seven days to conduct a thorough and comprehensive study of the learning materials specified for the thematic education. This will be done through special guided learning, collective self-study, and concentrated discussions, ensuring a complete and systematic study of the main content of Xi Jinping's Thought on Socialism with Chinese Characteristics for a New Era. The study class will closely focus on the fundamental tasks of thematic education, leading and promoting the

[436] ExPace - Party and Mass Work Department, "ExPace Holds a Mobilization and Deployment Meeting on Studying and Implementing Xi Jinping's Thought on Socialism with Chinese Characteristics for a New Era 火箭公司召开学习贯彻习近平新时代中国特色社会主义思想主题教育动员部署会," 微信公众平台, September 22, 2023, http://mp.weixin.qq.com/s?__biz=MzI2MjUyOTMyMg==&mid=2247500298&idx=1&sn=c1dfe1adf833bd8752d690aa2060284a&chksm=ea4b4a4fdd3cc3593502db0d26168f5cf0ee03b63cbc4738cc3d0eac2cb9674b40c7973e96df#rd.

company's efforts to study and implement Xi Jinping's Thought on Socialism with Chinese Characteristics for a New Era in a deep and practical manner." [437]

b. *Historical Continuity*

ExPace's identification with the historical continuity of national space having its roots under Mao Zedong would provide a plausible explanation for the particular epic tone of certain posts, notably those depicting the workforce at work as brilliant and courageous workers victorious over the adversity through harshness. In one interview (exchange no. 14), this style was referred to as "the spirit of Lei Feng" [雷锋精神 *leifeng qingshen*], referring to the PLA soldier celebrated for his sacrificial devotion to work[438].

Another distinctive point of ExPace communication on social media is the relation it entertains with the history of the space program and national modern history at large. The notion of historical heritage is present in the content of numerous articles.

"*The lectures on the development history and spirit of Sanjiang during the induction training impressed me deeply. In that era of material scarcity, the older generation of Sanjiang people rose to the challenge and came to the mountainous area of western Hubei to participate in the construction of the third line without hesitation. This hard work and pioneering spirit is worth learning for every generation of Sanjiang people. Today, as the successors of the aerospace industry, we still face a bumpy road, but our belief in our hearts is extremely firm - to develop more advanced models, build every rocket, and send every satellite well, and shine our glimmer for the construction of the motherland in our own positions*!"[439]

"*Through studying the spirit of aerospace culture, I understand that the development of China's aerospace industry is difficult. Generation after generation of Chinese aerospace people have*

[437] ExPace - Party and Mass Work Department, "ExPace's Party Committee's Course on Study and Implementation of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era Theme Education Opens 火箭公司党委学习贯彻习近平新时代中国特色社会主义思想主题教育读书班开班," 微信公众平台, October 7, 2023, http://mp.weixin.qq.com/s?__biz=MzI2MjUyOTMyMg==&mid=2247500838&idx=1&sn=b202d2e842a511e3c59bd9e95e495c25&chksm=ea4b4c63dd3cc575574682f7943d029dd3cf608197b43ffcba70a4292af1aff2ff0d6af184ba#rd.

[438] Lei Feng was a Chinese soldier in the People's Liberation Army who became a national hero and a cultural icon in China. Born in 1940 and dying in an accident in 1962, he is celebrated for his selflessness, modesty, and dedication to helping others After his death, the Chinese government promoted him as a. model citizen through a massive propaganda campaign, encouraging the public to emulate its spirit of altruism and hard work.

[439] ExPace - General Assembly and Adjustment Center, "To Be Broad and Meticulous | [General Assembly and Adjustment Center] Newcomers Say 致广大而尽精微丨「总装总调中心」新人说."

been pioneering, enterprising, hardworking and dedicated, and have embarked on a development path of self-reliance and independent innovation. In the new era, we must always motivate ourselves to be in awe, have lofty ambitions, work hard to improve our internal strength, refine our skills, dare to be the first, and be innovative. In the future, I will continue to maintain the working attitude of "the road is long, but it will be reached; the task is difficult, but it will be accomplished", learn design experience from outstanding predecessors, take the initiative to solve technical problems, cultivate good engineering thinking, actively participate in model tasks, and contribute my own strength to the aerospace industry."[440]

Over the study period, six articles can be linked to the notion of history and commemoration, either at the company or at the national level. Regular reminders of chronology could be interpreted as an effort to place ExPace in the long history of the "national team", while presenting it as a modern incarnation of commercial space. National heritage, is present in 3 posts: one dedicated to the Mukden incident 18th of September, one to the massacre of Nanjing 13th December and one to Qian Xuesen 11th December. Three other posts were dedicated to the 10 years of history of ExPace and other anniversary launches.

c. *Mobilization*

The calls for mobilization to achieve the objectives of the last quarter, without equivalent in the communication of other companies, could also evoke the functioning of political campaigns This model emphasized political fervor and collective commitment to achieve objectives set by the plan. The articles seem to aim to inspire and motivate readers by emphasizing collective effort, resilience, and the pursuit of excellence, fostering a sense of unity and purpose among employees and stakeholders.

"*On August 26, the second strategic work meeting of CASIC and the 15th meeting of the Strategic Management Committee and the third Strategic Science and Technology Innovation Frontier Forum opened in Beijing.*

The meeting was guided by Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, thoroughly implemented the spirit of the 20th National Congress of the Communist

[440] ExPace - Structure department, "Learn → Love → Reverence → Struggle | "[Tructure] Newcomers Say 学习 → 热 爱 → 敬 畏 → 奋 斗 丨「结 构」新 人 说," 微 信 公 众 平 台, September 11, 2023, http://mp.weixin.qq.com/s?__biz=MzI2MjUyOTMyMg==&mid=2247500042&idx=1&sn=520a67e3d987bb1f4a3a49a5ea67d1d1&chksm=ea4b494fdd3cc059d7704a13b7821649098b0eb5f5ce4625a288fc5fe011d19a82f15551fc5e#rd.

Party of China, implemented the important speeches and important instructions and instructions of General Secretary Xi Jinping, and systematically summarized the implementation of the development strategy and major deployment of the group company since the first strategic work meeting, carefully analyzed the new situation, new tasks and problems in development, and made adaptive adjustments and improvements to the "14th Five-Year Plan" and medium- and long-term development goals, further unified thoughts, gathered strength, and accelerated the construction of a world-class aerospace and defense group company.[...]

Yuan Jie emphasized that the Group Company must more closely unite around the Party Central Committee with Comrade Xi Jinping as the core, adhere to Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era as the guide, comprehensively and deeply implement the spirit of the 20th National Congress of the Communist Party of China, deeply understand the decisive significance of the 'Two Establishments,' enhance the 'Four Consciousnesses,' strengthen the 'Four Self-Confidences,' achieve the 'Two Upholds,' keep the 'big picture of the country' in mind, remember the 'three imperatives,' work together with one heart and one mind, and forge ahead with courage. We must grasp the 'three generalities,' use the 'two methods,' and play the 'three roles' to accelerate the construction of a world-class aerospace defense group company, effectively support the construction of a world-class military and aerospace power, and make new and greater contributions to the comprehensive construction of a modern socialist country and the comprehensive promotion of the great rejuvenation of the Chinese nation.[…]"[441]

"*Currently, the Aerospace Sanjiang Party Committee has issued a call to action: Sprint to the fourth quarter and win the final battle. ExPace Party Committee promptly held the fourth quarter sprint mobilization meeting, urging all employees to fully embrace a spirit of "fighting hard," "attacking with determination", and "advancing with momentum", igniting a wave of "overcoming difficulties and going all out" to complete all tasks for 2023 with high quality.*

[441] ExPace, "China Aerospace Science and Industry Corporation's Second Strategic Work Meeting Opens: Fully Implementing the Spirit of the 20th National Congress of the CPC, Focusing on Enhancing Core Competitiveness and Core Functions, Accelerating the Construction of a World-Class Aerospace Defense Group Company 中国航天科工第二次战略工作会开幕：全面贯彻落实党的二十大精神，着力提高核心竞争力、增强核心功能，加快建设世界一流航天防务集团公司," 微信公众平台, July 28, 2023, http://mp.weixin.qq.com/s?__biz=MzI2MjUyOTMyMg==&mid=2247499788&idx=1&sn=f0a27560859132b64e9b81e6ffb2381b&chksm=ea4b4849dd3cc15f4f36e7d040d7595bb3de2e8f3ae6d79920fadc3f46fb2d7edd06c4d7efdf#rd.

All company leadership members, chief designers of various models, department heads, Party branch secretaries, and team leaders attended the fourth quarter sprint mobilization meeting. The meeting was presided over by Vice General Manager Huang Lei.

The company Party Committee issued the following calls to all employees:

Raise Political Awareness and Unify Thoughts: Enhance the sense of mission, responsibility, and urgency to ensure the successful completion of the annual tasks. The Party Committee must deeply study and implement Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, resolutely carry out the important speeches and instructions of General Secretary Xi Jinping, fully recognize the current task situation, remain steadfast in the annual task goals, focus on key and difficult points, scientifically coordinate and advance, overcome all difficulties, and ensure the successful completion of all scientific research and production tasks. […]"[442]

d. *CAS Space: a Toned Down Presence of the CCP*

In the case of CAS Space, there is a certain presence of the CCP, which appears primarily in an "institutional" manner. That is, some posts—particularly in the Meeting category—mention the presence of Party committee members from CAS or other entities. In particular, two articles mention of the arrival of party commissioners from external organizations (see exerpts below), the organization of an activity of joint party between the company and Yizhuang innovation zone[443].

However, the propagandistic tone is much less pronounced compared to ExPace. Some posts contain mobilizing rhetoric[444], and there are occasional references to Xi Jinping's thought or

[442] ExPace - Science and Technology Research department, "ExPace Held the Fourth Quarter Sprint Mobilization Meeting【决胜四季度】火箭公司召开四季度冲刺动员会," 微信公众平台, October 15, 2023, http://mp.weixin.qq.com/s?__biz=MzI2MjUyOTMyMg==&mid=2247500998&idx=1&sn=0c3e6a4b0aaf4e9bdababede1c1a9308a&chksm=ea4b4c83dd3cc5957b55344c4d7a9396cc5b72f0ccb735879c5005a03b9c6171b5595e9a50a6#rd.

[443] CAS CAS SPACE, "Dynamic News | CAS Space and Beijing Yizhuang Science and Technology Innovation Bureau Conduct Joint Party Building Activity 动态资讯 | 中科宇航与北京亦庄科技创新局开展联合党建活动," 微信公众平台, July 13, 2023, http://mp.weixin.qq.com/s?__biz=Mzg5NDA5NTY3MA==&mid=2247498276&idx=2&sn=685f6b056a93472805ad9f352bf34cc0&chksm=c026627df751eb6bb320c3f01eda24b8c7ec2e6cc9b4ba52ffdb4dc8367c5b955dd29674b7e4#rd.

[444] CAS SPACE, "Dynamic News | CAS Holdings and CAS Capital Visit CAS Space Industrialization Base for Research and Guidance 动态资讯 | 国科控股与中科院资本一行莅临中科宇航产业化基地调研指导."

the 20th Party Congress, but their presence remains significantly weaker than in ExPace's communication.

In terms of imagery, no systematic use of CCP iconography was found during the study period—such as the hammer and sickle, red color schemes, stars—bringing CAS Space's communication closer to that of *minying* enterprises.

"*On July 13, Suo Jishuan, Secretary of the Party Committee and Chairman of Guoke Holdings, Zhang Yong, Member of the Standing Committee of the Party Committee of Guoke Holdings, Deputy General Manager, and Chairman of CAS Capital, and others visited the CAS Space Industrialization Base for research and guidance.*

Secretary Suo Jishuan and his party visited the assembly and test plant, digital intelligent exhibition hall, semi-physical simulation laboratory, remote measurement and control hall and other places, and fully understood the entire process of production, assembly and testing of the Lijian series of launch vehicles, and fully affirmed the rapid development of CAS Space. During the discussion, the two sides analyzed and discussed topics such as party building leading the high-quality development of enterprises, the future development direction and prospects of commercial aerospace, the encouragement and introduction of scientific and technological innovation talents, and listing planning.[…]"[445]

"*Recently, Wei Minghai, Party Secretary and President of Guangzhou University, Wang Jinnian, Professor of the School of Geographical Sciences of Guangzhou University and Academician of the International Academy of Astronautics, Wu Zhifeng, Dean of the School of Geographical Sciences of Guangzhou University, and Li Yan, Secretary and Vice President of the Research Institute of Guangzhou University, visited the CAS Space Industrialization Base for exchanges and research, and conducted in-depth exchanges and discussions with Yang Yiqiang, Chairman and President of CAS Space.*

Secretary Wei Minghai and his delegation visited the assembly and test plant, the skill master studio, the digital intelligent exhibition hall, the semi-physical simulation laboratory, the remote measurement and control hall and other places[…].

[445] CAS SPACE, "Dynamic News | CAS Holdings and CAS Capital Visit CAS Space Industrialization Base for Research and Guidance 动态资讯 | 国科控股与中科院资本一行莅临中科宇航产业化基地调研指导."

During the discussion, the two sides reached a high degree of consensus on the direction of school-enterprise cooperation. Wei Minghai said that Guangzhou University pays great attention to the field of aerospace and continues to introduce high-level aerospace talents to continuously improve the school's scientific research and comprehensive strength. In the future, it hopes to reach in-depth cooperation with China Aerospace in school-enterprise cooperation, discipline construction, student training and other aspects.[…]

The report of the 20th National Congress of the Communist Party of China proposed that education, science and technology, and talents are the basic and strategic support for the comprehensive construction of a socialist modern country. In the future, China Aerospace will continue to strengthen the deep integration of industry, academia and research with universities in the Guangdong-Hong Kong-Macao Greater Bay Area, and join forces with scientific research talents from universities including Guangzhou University to jointly create a first-class scientific research platform with open collaboration, joint innovation and focus on the frontier, solve the problems encountered in the development of my country's aerospace, and further improve the level of transformation and industrialization of scientific and technological achievements." [446]

One of the articles is a debriefing meeting for the first half of 2023. It is interesting to note that it illustrates both similarities and differences with ExPace and a difference with the communication of private enterprises which do not make mention of this type of meeting. This meeting could be considered a mobilization meeting, in the same way as the end of year meetings at ExPace. At the same time, the July 6 post also illustrates the differences with the tone of ExPace's communication, with a remarkable absence of any direct mention of the Party. The heritage of the space sector, on the other hand, is mentioned, which we find in the CAS SPACE communication, for example in the portraits of workers.

"*On July 6, China Aerospace Science and Technology held a work summary meeting for the first half of 2023 with the theme of "Surge and sail together to improve efficiency and strive to set sail again", aiming to summarize the work achievements and experience in the first half of the year, analyze the existing problems and challenges, and deploy the work goals and*

[446] CAS SPACE, "Dynamic News | Guangzhou University Party Secretary and President Wei Minghai and Delegation Visit CAS Space for Exchange and Research 动态资讯 | 广州大学党委书记、校长魏明海一行赴中科宇航交流调研."

measures for the second half of the year, and strive to successfully complete the various goals and tasks for the whole year.[…]

At the beginning of the meeting, the company leaders comprehensively summarized and reviewed the work progress of China Aerospace Science and Technology in the first half of 2023. 2023 is a year of rapid development and fruitful harvest for us. Looking back at the first half of the year, the launch mission of the Lijian-1 Yao-2 carrier rocket was a complete success, breaking my country's record of launching multiple satellites with one rocket with "26 satellites in one rocket", and appeared on CCTV's "News Network" three times; the demonstration and verification flight test of the vertical recovery at sea was a complete success; the demonstration of the Lijian-1 carrier rocket's multi-scenario universal sea launch plan passed the review smoothly, and many exciting moments of glory are worth remembering.

As a Chinese commercial aerospace unicorn enterprise, we made a heavy appearance at domestic and foreign exhibitions such as the Paris Air Show and the China Science and Technology Expo, fully demonstrating the hard power and innovation of aerospace technology; in addition, we also won the third prize of the 11th China Innovation and Entrepreneurship Competition Technology Integration Professional Competition and the 4th China Aerospace Innovation and Entrepreneurship Competition, the 2023 Investment Industry Science and Technology Innovation Enterprise 100 List, and the 2023 Most Innovative Enterprise 10 honorary awards.

Behind the dazzling achievements, every colleague's joint efforts are indispensable. In order to encourage the work style of CAS Space to dare to take risks, dare to fight, and dare to take the lead, the summary meeting also released a model project reward plan to encourage CAS Space to continue to strive for the first place, forge ahead, and always maintain the spirit of "being a spaceman who never fades", and make new contributions to the country's aerospace cause. […]

The people of China Aerospace have inherited the best qualities and traditions of China's aerospace industry, and have a selfless and fearless spirit and a like-minded team. In the second half of 2023, we will anchor higher, farther and broader goals, for the development of China Aerospace, for our original aspirations and dreams, bravely climb the peak of aerospace

technology, and aspire to become a world-class aerospace enterprise, and continue to struggle on the journey of building a strong aerospace country!"[447]

As we can see, the CCP and propaganda are noticeable in CAS Space's communication, while less prominent than in ExPace's. No explicit propaganda discourse was detected in the WeChat communication of commercial enterprises. One post by RocketPi mentions the establishment of a Party committee[448], and several companies celebrated the anniversary of the Party's founding, an aspect that should be weighed against the systematic publication of poster-style articles for national holidays in the National Holiday category.

Both ExPace and CAS Space are affiliated with larger state institutions. The size and public nature of their parent institutions, as well as the direct or indirect nature of their affiliation, likely influence the presence of Party-related elements in their communication. In ExPace's case—and possibly in CAS Space's as well—these companies may have inherited a Party organizational structure from their parent entities. It is conceivable that state-owned enterprises, which serve a public service function, also play a larger role in implementing directives from central authorities.

The strong presence of propaganda in ExPace's WeChat communication, absent in private enterprises, may also stem from a corporate culture inherited from its parent company, CASIC.

In this subsection, we observed that ExPace's propaganda discourse is often linked to historical references, sometimes invoking the "glorious past" of aerospace pioneers, summarized by the phrase "aerospace spirit". It is worth noting that state-owned enterprises are often categorized as part of the "traditional space sector".

The hypothesis can be made that the legitimacy to claim such a heritage is significantly stronger for ExPace—a spin-off of CASIC and a historical actor in the space industry—than for other enterprises. This notion of heritage is particularly emphasized in the "worker portraits" mentioned earlier, whether through actual statements or those merely attributed to the

[447] CAS SPACE, "Dynamic News | Riding the Waves Together, Striving for Efficiency and Leadership — CASC Yuhang Holds 2023 First Half-Year Work Summary Meeting 动态资讯 | 浪涌扬帆齐聚力 提效争先再起航 —— 中科宇航召开2023年上半年工作总结会", July 6, 2023, https://mp.weixin.qq.com/s/THbiPsYMrsJANZ_y1Qyh5g

[448] RocketPi, "Stay true to the original aspiration: the Party Branch of Rocket Pai (Beijing) Aerospace Technology Co., Ltd. has been established! 不忘初心，火箭派（北京）航天科技有限公司党支部成立！" , July 14, 2023, https://mp.weixin.qq.com/s/_ZBvHh7fz4iadwoF0pUEYA

individuals interviewed. It also echoes the comments made by Shen Nian in Chapter 2, where he contrasted the casual, even reckless and ostentatious, attitude of minying enterprises with the tradition of scientific rigor, caution, and economic pragmatism upheld by traditional space companies.

For CAS Space, identification with the historical heritage of the space sector is also possible, but likely to a lesser extent than for ExPace. While CAS has been present since the early days of China's space industry, it is not systematically mentioned in interviews as part of the "traditional space sector". The most striking indication that CAS is not a major symbolic player in China's space industry (at least in symbolic terms—precisely situating CAS within China's space organizational chart is complex and beyond the scope of this dissertation) is the layout of the exhibition hall at the China Space Conference. In both editions, the entrance to the industrial section—positioned as secondary to the presentation of space programs—is flanked by the imposing booths of CASC and CASIC, which overshadow the smaller booths, including those of CAS laboratories.

In the field of launch vehicles, both the level of technological advancement and the content of interviews indicate that the company is a newcomer, competing with minying enterprises, particularly for clients. The fact that, according to an employee interview, the emergence of OrienSpace has challenged CAS Space's position in a technological niche is indicative of the company's more precarious status compared to SOE spin-offs.

It is also possible that this heritage has tangible effects on corporate culture, including the strong presence of Party committees—particularly in communication through propaganda offices—a tendency toward secrecy, and a distinct communication style. Although assessing this aspect is challenging for me as a foreign researcher, unfamiliar with the representations conveyed in the communication of the companies studied, it is possible that ExPace's communication style, and more broadly that of state-owned enterprises, could be perceived by Chinese observers as conventional or, in a more critical sense, "old-fashioned".

This interpretation aligns with a remark heard in an interview: a worker from a private launcher enterprise (exchange no. 3) compared his company to traditional ones, stating that it had the advantage of being "more modern, similar to big international firms".

Chapter Conclusion

This seeked to demonstrate that Chinese commercial space launch enterprises, grouped among consensual categories which were relevant in analyzing their financial data also exhibit distinct communication strategies on WeChat. Private minying companies primarily use the platform to broadcast technological advancements, tests, and launch updates, mirroring their need for visibility and external financing. Their communication is oriented toward showcasing technical credibility, likely aimed at attracting investment and clients.

In contrast, ExPace, as a spin-off of a traditional SOE, focuses on the workforce and Party building activities, hinting at a more internally oriented communication. Its publications' near-total absence of technical content could suggest a cultural adherence to institutional secrecy and a different understanding of the platform's role—more as an internal propaganda tool than a marketing outlet.

CAS Space occupies an intermediate position. While it embraces scientific outreach and technical transparency similar to private enterprises, its content also retains symbolic nods to its state-affiliated roots. Its hybrid character is reflected in a communication strategy that blends public education with efforts to assert its technical legitimacy and national alignment.

Ultimately, WeChat communication strategies provide a revealing lens through which to understand deeper structural and cultural differences within China's commercial space sector—differences that may not be visible through financial or legal data alone.

Conclusion

Summary of findings

This dissertation set out to investigate the emergence and characteristics of commercial space activities in China, with a particular focus on the launch sector. Motivated by the relative paucity and occasional superficiality of English-language literature on the subject, the research was grounded in Chinese-language sources and empirical fieldwork, integrating both qualitative and quantitative methods. Across five parts, it has provided a layered and multifaceted analysis of China's commercial launch sector, tracing its intellectual framing, policy context, market dynamic, financial configurations, and discursive constructions. What emerges is not a coherent, top-down industrial strategy, but a composite, fragmented, and at times contradictory space ecosystem shaped by competing actors, ambiguous policies, and uneven incentives.

Part 1 of the dissertation explored the Chinese-language literature on commercial space, based primarily on CNKI sources, with a marked prevalence of specialized press and promotional content over rigorously peer-reviewed research. This section revealed the dominant position of institutional actors, especially the China Aerospace Science and Technology Corporation (CASC), in shaping the discourse. While a near-universal consensus on the necessity and positivity of commercial space was observed, this agreement masks divergent definitions, possibly underlying tensions. In particular, the inclusion of state-owned enterprise (SOE) spin-offs under the "commercial" label appeared as a possible discursive strategy, enabling SOEs to occupy the discursive field within a narrative nominally about market liberalization, while maintaining their structural privileges. The literature reflected a dual movement: the legitimation of commercial space as a national priority, and the preservation of incumbent dominance through definitional vagueness.

Part 2 turned to the policy framework governing commercial space in China, analyzing a series of regulatory texts of various nature. The findings demonstrated a policy landscape that is polycentric on the one hand, experimental on the other hand. High-level programmatic texts provide vague encouragements for private and mixed capital participation, while more detailed provisions emerge either at the local level or later in a "piecemeal" fashion. This reflects a pragmatic, reactive governance style: commercial space policy seems not to have unfold from a master plan but instead to have followed a pattern of exploratory endorsement, later formalized in response to developments already underway. The policy treatment of commercial

launchers followed this arc precisely: absent in early texts, they were explicitly encouraged only in 2019, despite the existence of private launcher firms since at least 2014. Local governments emerged as crucial intermediaries, translating central policy signals into concrete incentives or industrial support schemes, albeit in uneven and speculative ways.

Part 3 examined the structure of the commercial launch market itself, using a comparative analysis of thirteen key companies. A central finding here is the persistence of three distinct enterprise profiles: wholly private (*minying*), SOE spin-offs, and hybrid entities affiliated with the Chinese Academy of Sciences (CAS). These types differ not only in their ownership structures but in their technological strategies, market behaviors, and institutional embeddedness. Private firms display a strong imperative to signal technological progress, often through tests and high-visibility launches, reflecting both investor pressure and competition. In contrast, SOE spin-offs operate with more institutional insulation, emphasizing political alignment and legacy narratives over technological experimentation. CAS Space, the hybrid actor, blends characteristics of both, standing as a liminal entity navigating between bureaucratic prestige and market-oriented pragmatism.

Part 4 deepened this analysis by examining financial data on the same set of companies. Here again, the typology proved analytically productive. Private companies demonstrated heavy reliance on founder capital and a patchwork of private and local state investors, often lacking central government equity support. In contrast, SOE spin-offs benefited from substantial capital infusions by their parent conglomerates and select access to national strategic funds. CAS Space's investment pattern reflected its institutional anchoring, with CAS-linked funds dominating its cap table. Geographic patterns in subsidiary distribution further illustrated differing expansion logics: while SOE spin-offs maintained geographic concentration, private and CAS-linked enterprises exhibited more diversified territorial strategies, sometimes aligned with provincial industrial policies or historical ecosystems.

Finally, Part 5 turned toward discourse from the launch enterprises themselves. A two-pronged qualitative analysis—field interviews and a study of WeChat communications—revealed stark differences in how these companies represent themselves and their activities. Private firms focused overwhelmingly on technological progress and self-branding; ExPace (CASIC spin-off) functioned more like an internal propaganda channel for party building; CAS Space presented a mix of scientific outreach, performance benchmarking, and patriotic signaling. These differences in communication style are not merely cosmetic. They reflect the deeper organizational cultures, incentive structures, and strategic constraints faced by each type of

company. The analysis ultimately reinforced the conclusion that “commercial space” is less a coherent industrial category than a battlefield of overlapping agendas and semiotic contestation.

Across these five parts, several broader conclusions can be drawn. First, the evolution of China’s commercial launch sector is best understood as emergent rather than engineered. While central policy has increasingly embraced commercial space, the process has not followed a linear or unified plan. Instead, it has combined top-down encouragements, local opportunism, and bottom-up entrepreneurialism. Second, the category of “commercial” is itself unstable and contested. SOEs, private firms, and CAS-affiliated actors all lay claim to the term, yet their operational realities, funding structures, and institutional logics diverge sharply. Third, state involvement remains pervasive and often asymmetrical. Whether through policy instruments, funding access, or definitional gatekeeping, incumbent actors retain considerable advantages, complicating narratives of privatization or market liberalization.

Finally, this dissertation underscores the need to disaggregate both “state” and “commercial” in discussions of China’s space sector. Doing so not only clarifies the internal diversity of actors but also challenges simplistic binaries often deployed in some foreign analyses. In place of monolithic categories, what emerges is a complex ecosystem marked by hybridity, tension, and experimentation—a space not just commercial, but politically charged, historically layered, and institutionally entangled.

Opening: Toward an Opening of Chinese Space Sector Communication?

As final words to this dissertation, I would like to come back to its opening on the opacity of the traditional space sector, questionning the emergence of commercial space as a factor of change in the communication of the sector as a whole, including traditional enterprises via their spin offs.

During an interview with a senior specialized consultant (exchange no. 5), it was claimed that the communication strategies of SOEs and SOE-related enterprises were changing in the context of commercial space. Two factors were identified for this change. First, the competition represented by the new commercial space enterprises, particularly private ones. Their more open communication methods would be seen as a source of inspiration for traditional enterprises, which would now be compelled to become more visible. Second, the priority given to space endeavors by the Chinese government. This priority has made it necessary to raise awareness and popularize the subject, particularly among children and teenagers, in order to

encourage vocations and strengthen the pool of specialized talent. This idea reflects the findings of Chapter IV on the content of the *White Papers*. These factors would have initiated a revolution in communication for Chinese traditional space enterprises, accustomed to being discreet, if not secretive. Beyond this interview, the notion that aerospace SOEs are more secretive is, as we presented in Introduction, widely acknowledged and was raised in several discussions (exchanges nos. 1, 5, 7, 9).

Although it is not possible to demonstrate a clear causation, the hypothesis raised during exchange no. 5 finds some support in our research. SOE spin-offs are adopting new, specific communication strategies. An example of the emergence of new forms of communication is the appearance of open sales for launch services, in the form of auctions or advertisements, for which three examples were identified: one in 2020 by ExPace relayed by press articles, the other two during the study period on public communication via WeChat by companies affiliated with CASC.

Other weak signals of such a change have been identified, particularly concerning communication directed at children. For instance, several posts published on ExPace's official WeChat account feature a banner with a small baby character dressed in a spacesuit floating in a starry sky. During Space Day 2023 and 2024, a booth was dedicated to CASC-branded merchandise, particularly aimed at children. The company outsources the creation of such products (stationery, clothing, figurines, keychains, etc.) to a company named Chuangxiang, which also signs some posts on the official WeChat account, notably for creating stickers that can be used in messaging apps.

1. ExPace's Launch Live Auction on Taobao

The first example of a high-profile auction was the livestream sale of a satellite orbiting service on April 1, 2020. ExPace contracted such a service for Kuaizhou-1A, on behalf of Chang Guang Satellite Technology (CGSTL) for RMB 40 million. The sale took place on Taobao (a subsidiary of Alibaba and the main online sales platform in mainland China) through Weiya, who was major figure of live online sales or livestreams, which were booming in China at the time. The event generated 13 million views[449].

449 X. Rui, 4000 万元的火箭已在淘宝直播卖出：800 多人付定金 优惠了 500 万[40 million RMB rocket sold on Taobao livestream: more than 800 people paid a deposit；discount of 5 million], Kuai keji, 1 April 2020, https://news.mydrivers.com/1/681/681052.htm. While Taobao is the main online retail shopping platform in China,

While this was indeed a successful communication campaign, a number of observers including in China[450] questioned the spontaneous nature of the auction, which was undoubtedly the staging of a prearranged agreement between ExPace and CGSTL.

The event, all the more if staged, is indicative of a change in attitude on the part of players affiliated with the state sector. The aim would be to draw attention to the space sector, whereas the culture of traditional companies is one of discretion and secrecy. In particular, the use of a livestream star of the time and of the Taobao platform shows the desire to create “viral” content that reaches the widest possible audience.

As could be found in press articles relaying the event, Cao Meng, a member of ExPace’s underlined that the sale was an important move in terms of public communication as a mean to familiarize the public and potential investors with the aerospace field: "We just want to tell everyone that they can participate in the aerospace industry” [451]. Livestream is a far reaching and popular media to promote national commercial space sector, added to the prospect of attracting positive publicity to Wuhan, where ExPace has its headquarters, in the post-COVID recovery period.

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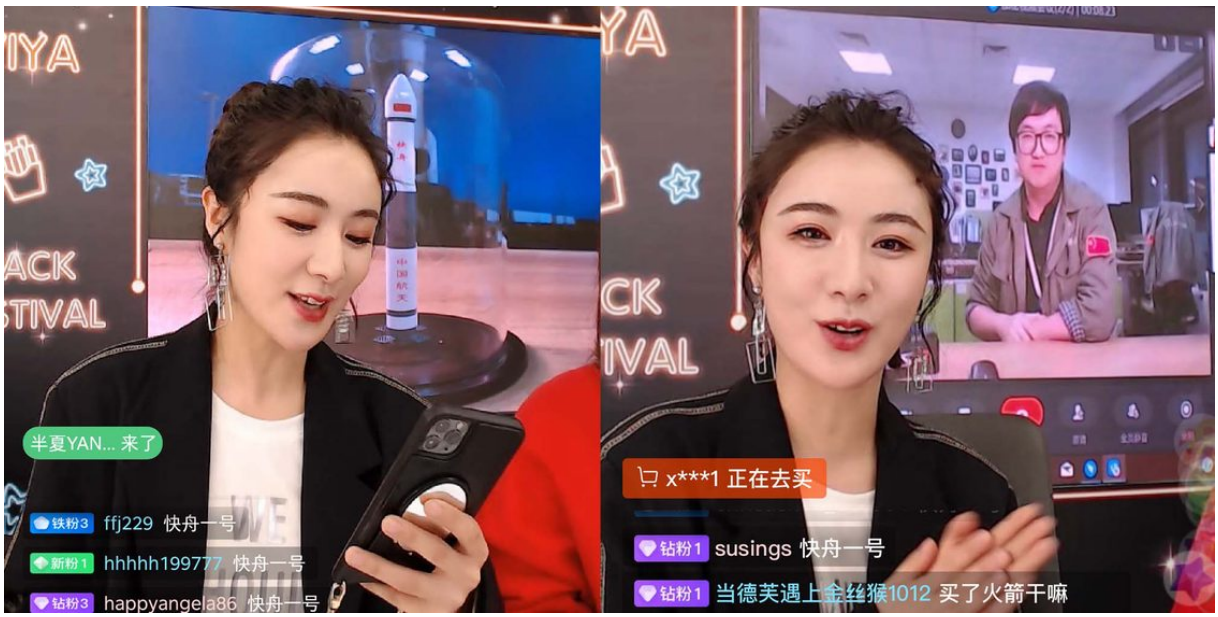
it is better known abroad through its mother firm, Alibaba, a digital giant. The practice of livestream, offering consumers real-time online teleshopping on numerous social and sales platforms through direct interaction with live streamers, has become a multi-billion industry in the country over the past few years, a trend reinforced in 2019 by confinement measures against COVID-19 epidemic. The sale or the rocket was animated by Wei Ya, a prominent figure of this field.

[450] J. Xu, « 4000 万直播卖火箭属炒作？ 对话航天科工相关负责人[Is 40 million RMB rocket sold on Taobao livestream a commercial hype？Dialog with the relevant people in charge at ExPace] », Keji ribao, 2 April 2020, https://finance.sina.com.cn/roll/2020-04-02/doc-iimxyqwa4775513.shtml.

[451] 淘宝直播打开新经济的想象力：4000 万元的火箭，也秒空！ [Taobao liverstream opened the imagination of the new economy: 40 million RMB launcher, gone in a few seconds!], Lie Yunwang, 2 April 2020, https://www.lieyunwang.com/archives/464760.



One possible objective for staging such auctions might be to subtly reinforce the dominance of SOEs and their subsidiaries within the discourse surrounding commercial space. These events not only elevate the visibility of the enterprises involved but also strategically associate them with a concept—the ambiguity of which, as discussed in this dissertation, could be leveraged to preserve the standing of SOEs.

Both Changguang and ExSpace were presented in the mainstream press as commercial space enterprises. Changguang's official microblogging platform announced netizens it wants to "open a new model of commercial aerospace" [452]. SixthTone, a Shanghai-based English-language publication presented ExPace as "*a company responsible for its own profits and losses under the market economy*", effectively blurring the frontier between the SOE spin off and *minying* enterprises operating in space launch.

[452] X. Rui, 4000 万买下淘宝直播火箭 长光回应：开启了商业航天新模式 [40 million RMB rocket sold on Taobao livestream Changguang responds: openning a new model of commercial aerospace], Kuai keji, 2 April 2020, https://news.mydrivers.com/1/681/681131.htm. Y. Fan, Wuhan-Made Rocket Sells for Astronomical Sum via Livestream, Sixth Tone, 2 April 2020, https%3A%2F%2Fwww.sixthtone.com%2Fnews%2F1005428%2FWuhan-Made%2520Rocket%2520Sells%2520for%2520Astronomical%2520Sum%2520via%2520Livestream.

2. CGWIC's Auction

During the study period, two other examples of sales open to the public by state-owned enterprises were identified on WeChat: one operated by the official WeChat account of China Great Wall Corporation, the other on China Rocket's.

On June 15, the official account of CGWIC made a post recounting an auction sale: "Success of the first Great Wall auction for "shared" rocket launch opportunities". The text translated below is accompanied by images and a video report.

"*On July 13, the Long March 6C launch vehicle launch opportunity auction project released by the Great Wall Company, a subsidiary of China Aerospace Science and Technology Group Corporation (CASC), was completed on the Aerospace e-procurement platform, marking the complete success of China's first rocket public auction. The auction project attracted a total of 11,348 onlookers and 13 enterprises applied for the project, which was finally won by a Suzhou-based science and technology enterprise after an evaluation of the creditworthiness and technical requirements of the bidding enterprises. The launch is scheduled to take place at Taiyuan Satellite Launch Center at the end of this year.*

The news received widespread attention from the industry as soon as it was released, with mainstream media inside and outside the country reporting on it. The phrase "China's first public auction of rocket launching opportunities" has risen to the top of the hot list on the home page of Microsoft's edge browser, and related topics such as "rocket launches can also be auctioned" and "the first public auction of Long March rocket launching opportunities" are being discussed on Weibo, Douyin etc. Related topics such as "rocket launches can also be auctioned" and "the first public auction of the Long March series of rocket launch opportunities" sparked heated discussions among the public in microblogging, jitterbugging and other new media, and quickly "went viral".

With the number of commercial satellites launches rising year by year, as an important witness and participant in the development of China's commercial space, the Great Wall Company has

continued to innovate and keep pace with the times in the process of providing commercial launch services. [453]

The successful bidding for the launch opportunity of Long March 6C launch vehicle through CASC space e-procurement platform is a brand-new attempt of Great Wall Company's digital marketing of commercial spaceflight and an important practice to implement the requirements of CASC's comprehensive implementation of digital spaceflight strategy, which has further innovated the market development mode of the commercial launch of the Long March rockets, expanded the channels, catered to the needs of the customers, and improved its market sense of sensitivity and perception. It further innovates the commercial launch market development mode of Long March rockets, expands channels, caters to customer needs, and improves market sensitivity and perception."

Several remarks can be made concerning the text of the post. First, it shares certain common features with the stated objectives of ExPace's auction, as mentioned above. One such feature is the role of the auction sale as a means to raise awareness. More than the substance of the sale itself, what is highlighted is the attention it garnered from the public: in the first paragraph, the number of viewers and participants is mentioned, and in the second, the extent of the reaction on social media. The article also presents this sale as a "first." Another element common with the communication surrounding ExPace's auction is the association in the third paragraph of the company with commercial space as an "important witness and participant in [its] development." The spectacular nature of the sale and the inclusion of a television report could be among the methods used to ensure the discursive dominance of state-owned enterprises over the concept of commercial space, as discussed in this dissertation.

However, certain elements suggest that the auction might go beyond mere staging to reveal more genuine commercial aspects. On one hand, the notion of cost is emphasized in the television documentary. The company that won the auction, Suzhou Yanhang, is presented in the accompanying video as a private company (*minying*) established in May 2024. The company's CEO, Tang Mingming, points out that this method made the price of the launch more accessible, with the price of 800 kRMB per kilo (approx. €10k) being lower than the usual price for a piggyback launch (100kRMB/kilo), for a project weighing 10-20kg, representing a total

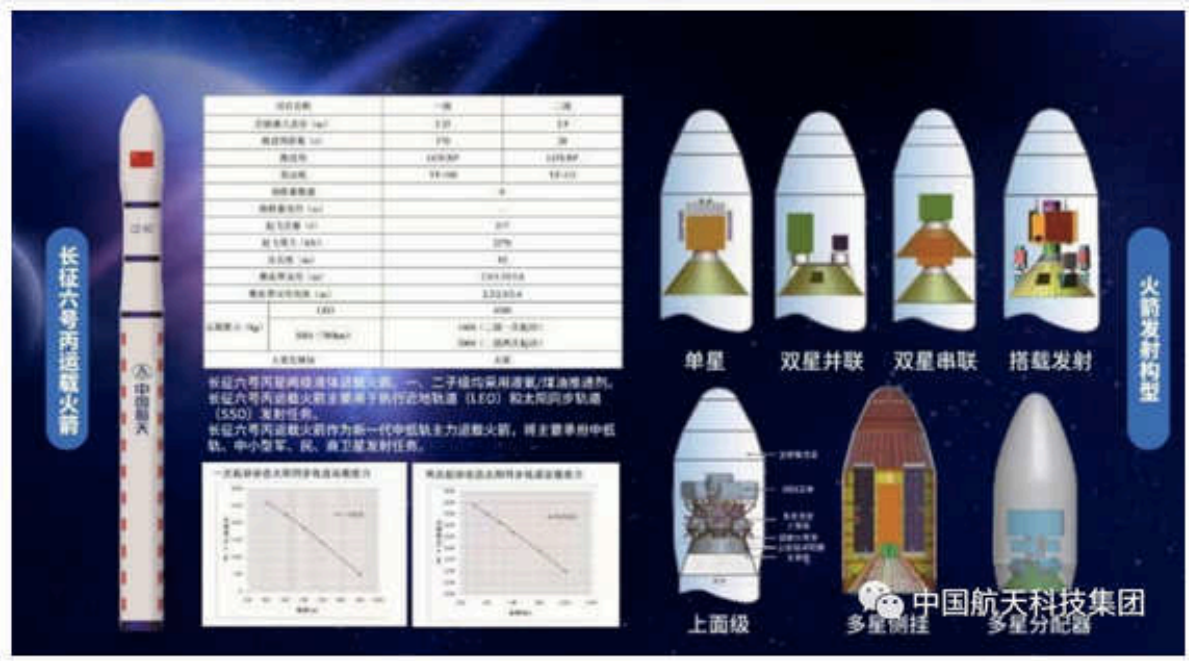
[453] CASC, "Success of the First Great Wall Auction for 'Shared' Rocket Launch Opportunities [长城公司'共享'火箭发射机会首次竞拍取得成功]," *WeChat*, July 15, 2023, https://mp.weixin.qq.com/s/gyMNp1H45f1iLWkeQu4gZA.

investment of around 1.5 M RMB (approx. €190k). He points out that a full, non-shared rocket launch service, costing several tens of millions of RMB, is not affordable. Wang Liming, deputy executive director of the CGWIC's "new information technologies" branch, points out that, with the orbital specifications fixed, the number of companies able to apply was reduced. The report concludes with the prospects opened up by the shared launch service for growing commercial space companies. On the other hand, the innovative nature of the sale is highlighted by CASC's implementation of a specially dedicated platform that is accessible to everyone in the last paragraph of the text.[454]

A screenshot of the online sales platform is given in the video report. Some of the launcher's specifications and the sharing arrangements are presented, along with the flight schedule. These images, of a technical nature, could demonstrate a greater openness of state-owned enterprises in the context of the new commercial space.



[454] Ibid.



序号	任务	发射窗口	轨道（km）/轨道类型	可用余量（kg）	整流罩/包络（m）	发射类型
1	任务 1	2023 年 8 月	500/SSO（LTDN 6:00）	100	3.35	搭载
2	任务 2	2023 年 10 月	530/SSO（LTDN 10:30）	200	3.35	共享火箭
3	任务 3	2023 年 11 月	630 29°/LEO	600	3.35	搭载
4	任务 4	2023 年 12 月	500/SSO（LTDN 10:30）	200	3.35	共享火箭
5	任务 5	2024 年一季度	638/SSO（LTDN 10:30）	200	3.35	搭载
6	任务 6	2024 年一季度	520/SSO（LTDN 10:30）	500	3.35/3.8	共享火箭
7	任务 7	2024 年 3 月	500/SSO（LTDN 6:00/9:30）	500	3.35	共享火箭
8	任务 8	2024 年 5 月	500/SSO	待定	3.35	共享火箭
9	任务 9	2024 年三-四季度	待定	待定	待定	共享火箭

What can be drawn from this publication is, once again, the desire to communicate about the space sector in the broadest sense, and the commercial space sector in particular, in order to bring the sector to the attention of the general public with the broadcast of a television report and a "spectacular" staging. This contrasts with the reputation of traditional state enterprises for secrecy.

Screenshots from the documentary show the sharing of a certain amount of technical information with the general public, including possible rideshare configurations.

On the other hand, perhaps more than in the ExPace example, a real commercial logic is potentially also at work with the communication of concrete rideshare possibilities on Long

Marc 6Bs, which would make it possible to make launchers more profitable on flights already planned. This concern is reflected in a third example of the change in communications by companies belonging more broadly to the SOE over the study period. This is a post from China Rocket's official account

3. China Rocket's Auction

On August 22 2023 China Rocket made an announcement via its official WeChat group, offering for sale whole rocket and carpool launch services for the Jielong-3 solid rocket launcher[455].

"*A good marriage starts with the delivery of a bouquet of flowers and the sending of a newsletter; the completion of a satellite constellations starts with the successful launch of a satellite. China Long March Rocket Company Limited launched the 2024 launch service booking on the occasion of the "Qixi" festival [equivalent of Valentine's day], offering a unique gift to all commercial space partners. With the ocean as the foundation and the clouds as the ladder, the Jielong 3 solid carrier rocket will build a bridge linking heaven and earth, and will set off from the earth and cross the long space, sending a satellite into orbit.*

This release is for the pre-order of Jielong-3 solid launch vehicle capacity in 2024, with an orbital altitude of 500km, the whole launch can be customized by contacting 6 months in advance, and the commercial carpooling schedule has a 200kg spare capacity in the first quarter, 400kg spare capacity in the second quarter, and 500kg spare capacity in the third quarter, if you have any demand, please book it as soon as possible.

Jielong-3 launch vehicle is the solid carrier rocket with the largest take-off scale and the largest fairing space in China, featuring "strong carrying capacity, large fairing envelope space, diversified launching modes, good economy, high launching efficiency, and short fulfillment cycle", and the 500km sun-synchronous orbit carrying capacity reaches 1.5 tons, which can be completed within one week. It can complete the technical preparation and launch within one week, and is a "cost-effective, highly reliable, fast fulfillment, fast launch" solid launch vehicle for the future satellite constellations and rapid network launch needs."

[455] China Rocket, "Sea Base, Stairs to Clouds, Launch Pad, Satellite Bridge [海基云阶 箭架星桥 haiji Yunjie, Jianjia Xingqiao]," *WeChat*, August 22, 2023, https://mp.weixin.qq.com/s/QIxw5vJ7wLwO6aoqNYE5yg.

The text of this latest example might lean even more towards a genuine commercial offer rather than a spectacle. The “staging” aspect is comparatively tuned down, and the content of the post is shorter and more fact-based.

The post emphasizes the launcher's responsiveness (launch possible in a week after technical preparation of the satellite) and the flexibility of its launch modes, notably piggy-back (size and modularization of the fairing space).

This post evokes a logic of cost savings, by offering carpooling or piggy back services to missions already planned for commercial payloads.



This direct communication from China Rocket also raises the question of the division of roles with CGWIC, whose function is precisely to market launch services for Long March.

The poster advertises “make a reservation for 2024 – Reservation 6 month in advance for a full rocket - Also rideshare -2024 1st Semester mass 200kg - 2024 2nd Semester mass 400kg -2024 3st Semester mass 500kg”.

Beneath the poster, the new China Rocket logo appears. Compared to the two previous examples, this could look more like a genuine search for customers interested in rideshare launch services. In fact, this service is very likely to provide competition for the service of private commercial launch companies, as the cost is low and the launchers much more reliable.

4. A Final Paradox: an Opening in Communications Confined to the PRC

To conclude this subsection, we can return to the initial hypothesis highlighted in the exchange no. 5 regarding a shift in the communication strategies of SOEs and their subsidiaries within the commercial space sector. Our research has identified the emergence of new forms of communication and marketing for SOEs' spin off enterprises linked to the traditional space sector.

The factors mentioned during the interview deserve further discussion. The competition from launch services provided by newly created companies, both private and mixed with the traditional sector, is not clear at the moment. Although the models developed by these companies are not yet fully mature, it remains true that the capacity of these developing models is redundant in relation to those marketed by spin-offs of state-owned enterprises, Kuaizhou and Jielong. While the research does not allow us to establish a definitive causality, it is entirely possible that this prospective competition plays a role in the communication efforts of these enterprises, especially since the latest communication campaigns identified on WeChat seemed more like genuine commercial opportunities than mere staging.

The fact that space has been elevated to the status of a national priority by the Chinese government implies greater efforts to communicate with the general public in order to attract talent to the sector. It is clear that the efforts described above, such as using a livestream star and producing a TV documentary, have significant public engagement value. These efforts also extend to popularizing the product among the general public, especially children.

Finally, the idea that new commercial space enterprises have influenced the methods of traditional space actors leads us to several observations.

One, the latest marketing and communication efforts are at partly driven by a cost-saving rationale, particularly for rideshare flight services, which aim to make launchers profitable. The logic of cost savings is one of the very *raison d'être* of commercial space.

Also, the renewal of this "auction" practice and the communication surrounding the sale of rideshare seats can be seen as a diffusion of sales methods from commercial space to institutional space. The CASC post states that this is "*Great Wall Company's brand-new attempt at commercial spaceflight digital marketing [...] which further innovates the development mode of the Long March rocket commercial launch market, broadens channels, meets customer needs and improves market perception capability.*" It would eventually aim to create a piggy-back

"Long Marche Express" launch service brand. Note that this idea of wanting to "create a brand" is a typical commercial enterprise strategy, echoing a need for visibility.

The communication methods of commercial companies may also have forced a change in the state related companies that have emerged from commercialization, pushing them to renew themselves, which is perhaps one of the objectives pursued by the encouragement of commercial space by the public authorities.

While new marketing methods may indeed be "inspired" by emerging space companies, they can also be viewed as a means of "appropriating" the concept of Commercial Space. As we have seen, state-owned enterprises have substantial communication resources, including on new media platforms (such as using the popular figure Weiya), and enjoy facilitated access due to their status (e.g., television presence). This privileged position allows them to establish themselves as leading players in Commercial Space, even though they are pre-existing actors in this trend. This mechanism, identified in the first part of this dissertation within specialized literature, also applies to mass communication channels, including television, print media, and social networks.

Finally, while this shift in communication strategies signals a partial opening of the space sector through commercialization, the research process itself revealed a paradoxical contraction in access to public information. Over the course of this work, key digital platforms used to gather data—such as CNKI, Aiqicha, and Tianyancha—became increasingly restricted or temporarily inaccessible, including a months-long loss of access to CNKI and interruptions to corporate data services. This progressive narrowing of access highlights the tension between growing external visibility within China and shrinking transparency for external researchers.

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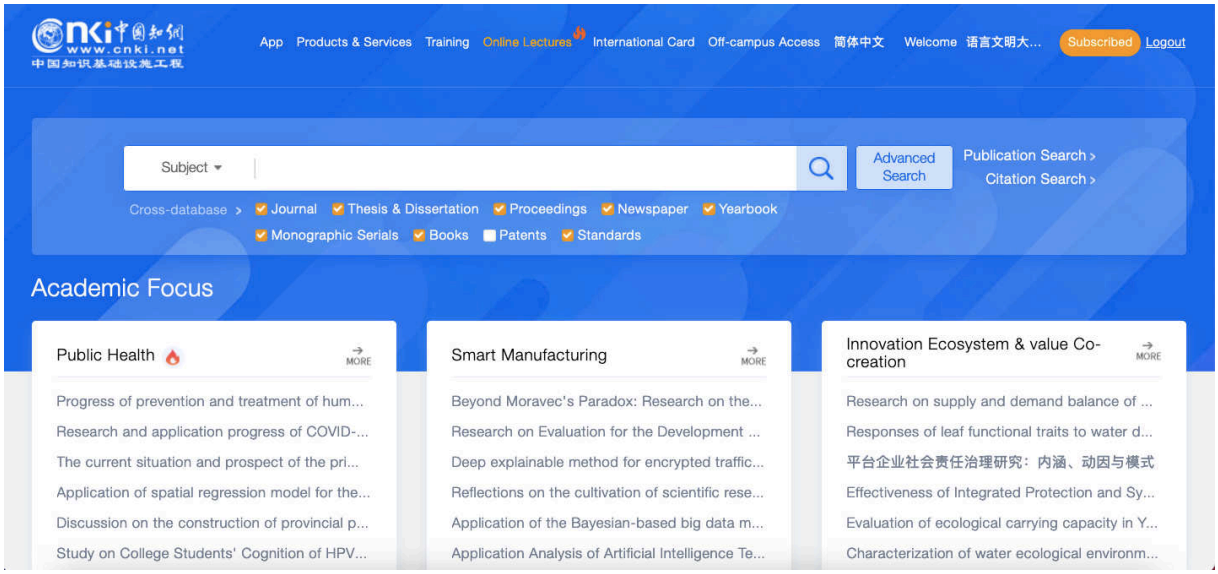
Annexes to Part 1

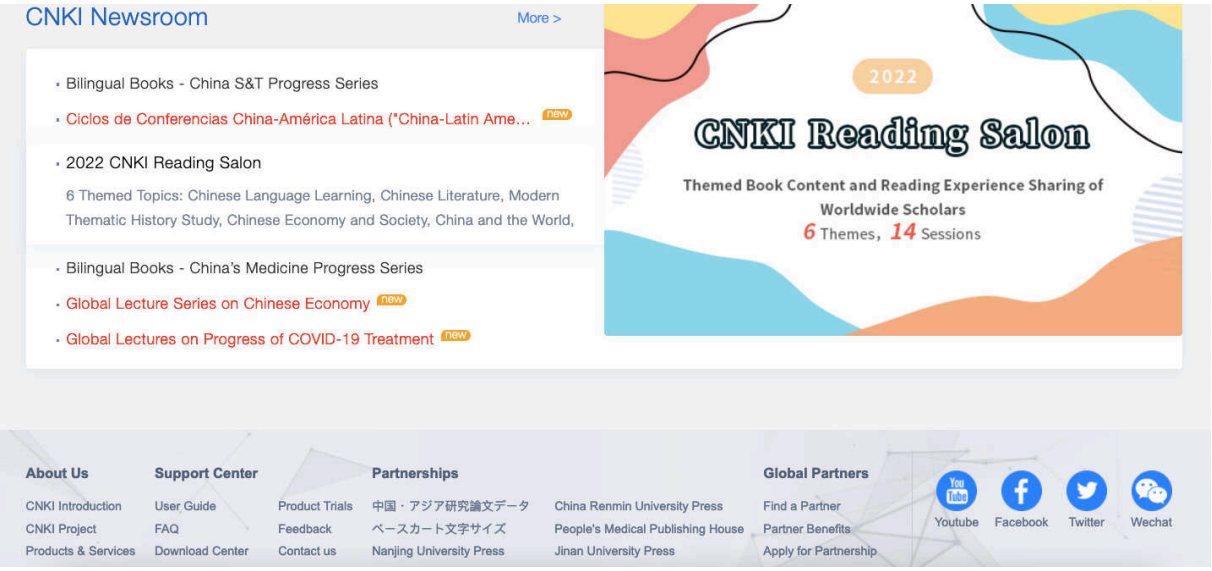
A. Using CNKI

Through the access given to the INALCO library, the CNKI homepage is primarily presented as a search bar which is the main tool of the page. Just below the search bar, 9 databases are accessible as checkboxes: 'Journal Thesis & Dissertation'; 'Proceedings'; 'Newspaper'; 'Yearbook'; 'Monographic'; 'Serials Books'; 'Patents'; 'Standards'. With the exception of 'Patent', all the boxes are checked by default. The default language for the page through this access is also English.



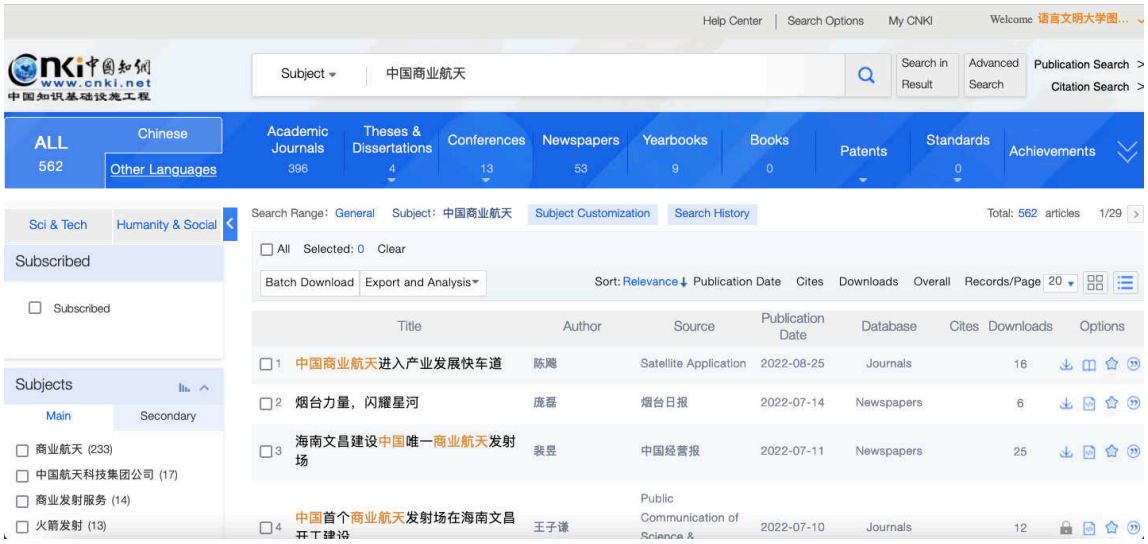


The search bar is surmounted by internal links to site services ('Products & Services'; 'Training Online'; 'Lectures'; 'International'; 'Card'; 'Off-campus Access'), as well as the language preference (the page is automatically presented in English for INALCO access) and login information. Further down the page below the search bar, different sections are accessible: on thematic subjects 'Academic Focus'; towards the different databases mentioned above 'Literature Databases'; recent publications highlighted CNKI Newsroom. A scrolling banner communicates on scientific events. At the bottom of the page, there are the headings 'About Us'; 'Support center', 'Partnership' and 'Global Partner'.

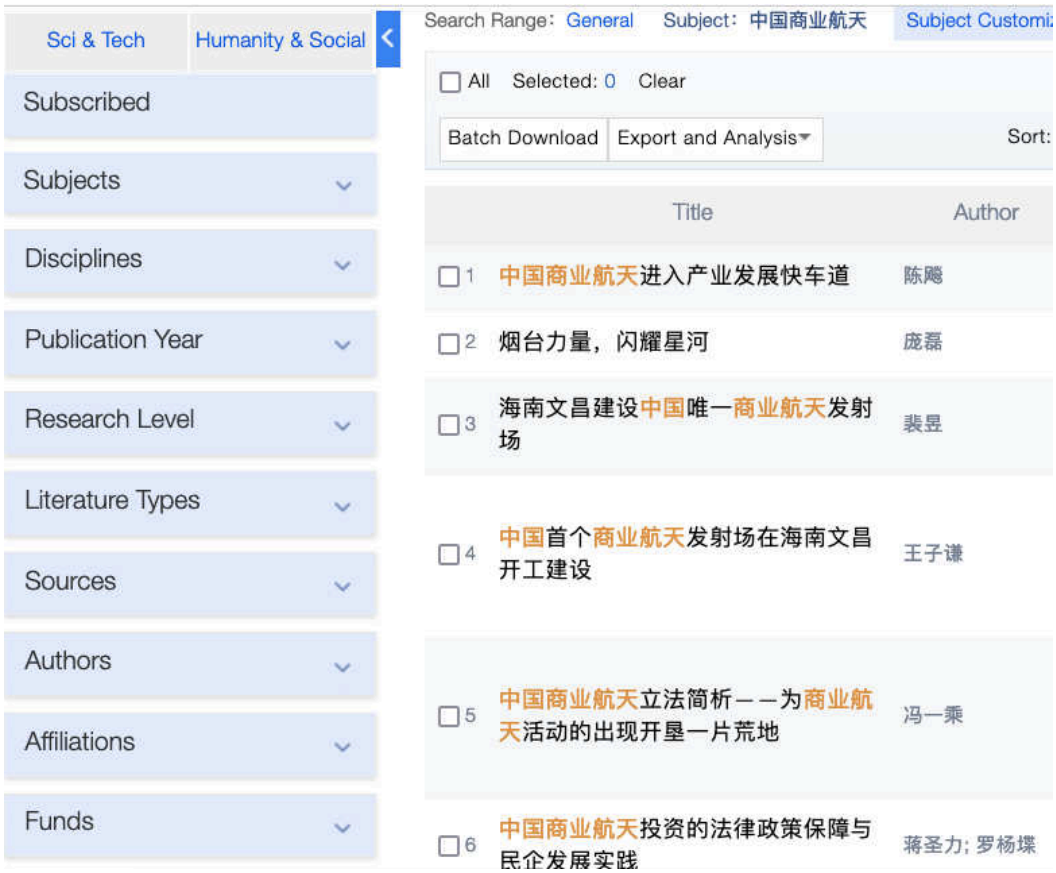


After typing in "中国商业航天" [*Zhongguo shangye hangtian]* in the search bar, a series of results organized in a table format is presented on the next page. The columns of the table are 'Title'; 'Author'; 'Source'; 'Publication'; 'Date'; 'Database'; 'Cites'; 'Downloads' and 'Options', the latter allowing to download, read in html, save as favorite or quote via hyperlink on corresponding icons.

We find the databases on a banner at the top of the page, which allow to filter the results. As you can see on the screenshot, a majority of results are present in 'Journal', 401 out of 567.



On the left, a series of other filters are presented as drop-down lists: 'Subjects'; 'Disciplines'; 'Publication year'; 'Research-Level'; 'Journals'; 'source types'; 'Authors'; 'Affiliation'; 'Funds'. The site allows to generate distribution graphs from these data.



B. CNKI History and Recent Investigations

1. History

CNKI was established in March 1999 as a national key project of Qinghua University. Part of a government-supported national digitization project, it was confided to an affiliated company[456] in the system of affiliated companies and funds Tongfang Qinghua 同房清华.

Research on Aiqicha allow to identify two relevant companies:

- Tongfang Zhiwang Digital Press Science and Technology Stock Limited Company 同方知网数字出版技术股份有限公司[*Tongfang zhiwang shuzi chuban jishu gufen youxiangongsi*] was likely the first incarnation of CNKI from July 1999 under the name Tongfang CD ROM Stock Limited Company 同方光盘股份有限公司 [*Tongfang guangpan gufen youxiangongsi*] until 2014. It has a subscribed capital of 80 million RMB, and a little less than 600 employees. The company has a number of subsidiaries in various Chinese provinces[457].
- Tongfang Zhiwang (Beijing) Science and Technology Company Limited(同方知网(北京)技术有限公司[*Tongfang zhiwang (Beijing)jishuyouxiangongsi*] which is the operator of CNKI. It was created in 2004. It subscribed capital is of 1 million USD, it has close to 1600 employees. Tongfang Zhiwang Digital Press Science and Technology doesn't seem to have any formal capitalistic link with Beijing Tongfang Zhiwang that operates CNKI platform. They do have the same chairman, Liu Changxin[458].

According to the information available on the platform:

> *"The concept of National Knowledge Infrastructure (NKI) was put forward by the World Bank's 1998 World Development Report. In March 1999, with the general goal of fully opening up information channels in all aspects of knowledge production, dissemination, diffusion and utilization, and building an exchange and cooperation platform that supports knowledge innovation, learning and application in various industries across the country, Wang Mingliang proposed the construction of China National Knowledge Infrastructure project, which was listed as a key project of Tsinghua University. [459]"*

[456] « CNKI project ».
[457] « 同方知网数字出版技术股份有限公司 - 爱企查 », consulté le 26 septembre 2022, https://aiqicha.baidu.com/company_detail_29670881481831.
[458] « 同方知网(北京)技术有限公司 - 爱企查 », consulté le 26 septembre 2022, https://aiqicha.baidu.com/company_detail_27899341352118.
[459] « CNKI project ».

Initially based on CD ROM, the platform would have followed 3 stages of development: basic infrastructure, CNKI 1.0 and CNKI 2.0. The latter is currently under development according to the website's information:

> *"After CNKI 1.0 was basically completed, CNKI has fully summarized the experience of industry knowledge services in the past five years. With the full application of big data and artificial intelligence technology to create a knowledge innovation service industry as a new starting point, CNKI project has entered the 2.0 era."* [460]

Initially a State-owned software company linked to Tsinghua University, China Academic Journal (CD-ROM) Electronic Magazine Co. Ltd., changed its enterprise property from state ownership to private in 2014. Today, Beijing-based Tongfang Knowledge Network Technology Co., Ltd., It still under supervision of the Ministry of Education, the Ministry of Science, the Propaganda Departmement of Communist Party of China, General Administration for Press and Publication.

It is interesting to see the development of this platform, first as an initiative incubated within a top university with a for-profit operation model, then becoming a monopolistic giant and undergoing privatization and securitization. In this respect, the development of the CNKI platform is also revealing of the trajectories followed by high-tech companies in the 1990s

2. *Recent Investigations*

In 2022, CNKI received increasing attention of local and foreign media in affairs that underline its prominence in PRC's academic and informational landscape. The platform has been under two investigations, one being antitrust-, the other cyber security related. The monopolistic position that CNKI developed over time and it being subjected to greater State scrutiny highlight key points of the legacy of Chinese policies for the high-tech sector and its contemporary management.

e. *Antitrust Investigation*

On May 13 2022, China's State Administration of Market Regulation (SAMR) (*guojia shichang jiandu guanli zongbu* 国家市场监督管理总部) announced an anti-trust case

[460] « CNKI project ».

investigation (*longduan xingwei li'an diaocha* 垄断行为立案调查) into CNKI[461]. This probe comes in a framework of broader scrutiny of monopolistic practices on internet platforms going on in the PRC.

> *The State Administration of Market Regulation, in accordance with the law, opened a case for investigation on the suspected monopolistic behavior of Zhiwang*
>
> *Recently, SAMR, on the basis of preliminary verification, in accordance with the law, has opened a case to investigate the suspected monopolistic behavior of Zhiwang.*[462]

This announcement took place a month after local media relayed the new that several institutes under China Academy of Science (CAS) would suspend subscription, citing subscription fees that had reached 10 million RMB the previous year.

Such grievances were not new, as at least six other universities and research institutes had threatened to- or discontinued their use of the platform invoking similar complaints over the past five years [463], including Wuhan Institute of Technology and Peking University in 2016, Taiyuan University of Technology in 2018[464].

The previous complaints had allegedly been short-lived however, which several authors explain by the situation of de facto monopoly enjoyed by CNKI[465]. In lack of alternative options, other existing platforms providing less coverage, these universities would have had to renew they subscription to CNKI later on[466].

According to Wang, the dominant position of CNKI on the world of academic publishing in China are rooted in its origin as a State-supported monopoly:

> *That year, China had been plugged into the internet for half a decade, and many of China's later online behemoths, like Alibaba, Tencent, and Sina, had just come into being. China's first online academic databases, such as Wanfang Data and Chongqing Weipu, had also been established in the 1990s. But, unlike its rivals, CNKI was endorsed by the*

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[461] « 市场监管总局依法对知网涉嫌垄断行为立案调查 », consulté le 15 septembre 2022, https://www.samr.gov.cn/xw/zj/202205/t20220513_344850.html.
[462] « 市场监管总局依法对知网涉嫌垄断行为立案调查 ».
[463] Lem, « Could China Be on the Verge of Breaking Up Database Publishing? »
[464] Lem; Chen, « CNKI's Security Problem »; Wang, « Publish or Perish ».
[465] Wang, « Publish or Perish »; Lem, « Could China Be on the Verge of Breaking Up Database Publishing? »
[466] Lem, « Could China Be on the Verge of Breaking Up Database Publishing? »

central government and would soon overtake them. CNKI could easily approach universities and journals for cooperation and convince them to agree to low prices, even exclusive deals. [467]

This influence would have later spiraled into a stranglehold, giving rise to IP -related and pricing abuses:

Due to the incentives in the academic system, CNKI's dominance snowballed, some experts say. "Schools want (good) citation rates, and students want to graduate," says Tao Xinliang, a professor at Shanghai University and a lawyer with more than 30 years of experience in intellectual property. He explains that with CNKI serving as the main source of academic data in China, schools know they have to cooperate. It gives CNKI absolute power, Tao says, and schools have no other option but to demand their students turn over the digital copyright of their theses as a condition for graduation.

[…]

"Between 2010 and 2016, CNKI raised its prices by an average of nearly 20% annually. In comparison, Elsevier last year reportedly pushed for a 4.5% annual increase." [468]

The case of the CNKI platform is part of a broader crackdown on monopolistic practices on online platforms.

a. Cyber Security Investigation

On June 24 2022, China Cyberspace Administration [*guojia hulianwang xinxi bangongshi* 国家互联网信息办公室] announced the launch by one of its sub-offices of a security investigation on CNKI.

Cybersecurity Review Office *launches cybersecurity review on Zhiwang*

The person in charge of the Office of Network Security Review [wangluo Anquan shencha bangongshi 网络安全审查办公室] said that in order to prevent national data security risks, maintain national security and protect the public interest, in accordance with the

[467] Wang, « Publish or Perish ».
[468] *Wang.*

National Security Law [guojia Anquan fa《国家安全法》], the Network Security Law [wangluo anqua fa《网络安全法》] and the Data Security Law [shuju anquan fa《数据安全法》], and in accordance with the Network Security Review Measures [wangluo anquan shencha banfa《网络安全审查办法》, on June 23, 2022, the Office of Network Security Review interviewed the person in charge of Tongfang Zhiwang (Beijing) Technology Co., Ltd. and announced the launch of the Zhiwang Network Security Review [wangluo anquan shencha 网络安全审查]. It is reported that Zhiwang holds a large amount of personal information and important data involving key industry sectors such as national defense, industry, telecommunications, transportation, natural resources, health and finance, as well as sensitive information such as my major projects, important scientific and technological achievements and key technology dynamics.[469]

The phrasing of the announcement underlines the sensitive nature, and hence, the relevance of some of the data available on CNKI to the Chinese authorities.

According to China Media Project analysts Chen and Bandurski:

"[…] the security-related action comes amidst a series of cybersecurity reviews for major tech companies, such as that for Didi Chuxing Technology Co., the ride-hailing company, which was recently completed after a full year. There have also been security reviews for US-listed companies, including the digital freight platform Full Truck Alliance – China's "Uber for trucks" – and the online recruitment platform Kanzhun[470]*."*

Both these news item, the antitrust- and the cybersecurity probe, underline the centrality of CNKI in the Chinese academic, and beyond that informational, landscape.

In the same way that the history of CNKI could be a typical case study of the evolution of Chinese digital companies in the 1990s-2020s, the recent crackdowns of the platform by the public authorities, on the one hand, the antitrust regulations for a former state monopoly, on the other hand, it is a security issue for a company that has become private is also revelatory, if not

[469] « 网络安全审查办公室对知网启动网络安全审查-中共中央网络安全和信息化委员会办公室 », consulté le 14 septembre 2022, http://www.cac.gov.cn/2022-06/24/c_1657686783575480.htm.
[470] Chen, « CNKI's Security Problem ».

typical of most recent political developments in the PRC that will be elaborated on in the fourth chapter.

Annex to Part 2

C. Enlarged List of Regulatory Texts Relevant to Commercial Space Activities in the PRC

Date	Enacting Organ	Title (English Translation)	Title (Chinese)
2000/12	State Council	White paper on space activities	《中国的航天》白皮书 (2000 年版)
2001/02	COSTIND ; Ministry of Foreign Affairs	Space Object Registration Management Measures	空间物体登记管理办法
2002/11	COSTIND	Interim Measures on the Administration of Permits for Civil Space Launch Projects	民用航天发射项目许可管理暂行办法
2006/10	State Council	White paper on space activities	《2006 年中国的航天》白皮书
2007/11	State Science and Technology Commission, National Development and Reform Commission	Several Opinions on Promoting the Development of Satellite Application Industry	《关于促进卫星应用产业发展的若干意见》
2011/12	State Council information bureau	White paper on space activities	《2011 年中国的航天》白皮书
2012/06	State Council	Several Opinions on Encouraging and Guiding the Healthy Development of Private Investment	《关于鼓励和引导民间投资健康发展的若干意见》
2014/11	State Council	Guiding Opinions on Encouraging Social Investment in Key Innovation Areas	《国务院关于创新重点领域投融资机制鼓励社会

			投资的指导意见》
2015/05	State Council	Made in China 2025	《中国制造2025》
2015/07	Ministry of Finance, National Development and Reform Commission	Notice on Tax Policies Related to Aerospace Development	《关于航天发展相关税收政策问题的通知》
2015/05	State Council Information Office	China Defense Strategy	中国的军事战略
2015/10	National Development and Reform Commission	Medium- and Long-Term Development Plan for National Civil Space Infrastructure (2015-2025)	《国家民用空间基础设施中长期发展规划（2015-2025）》
2015/12	National Bureau of Surveying and Mapping	Opinions on Strengthening surveying and mapping geographic information technology innovation	关于加强测绘地理信息科技创新的意见
2016/05	CPC central committee, State council	National Innovation Based Development Strategy	国家创新驱动发展战略纲要
2016/05	National Development and Reform Commission, Ministry of Industry and Information Technology	Notice on Implementing Major Projects for Manufacturing Upgrading and Transformation	《关于实施制造业升级改造重大工程包的通知》
2016/11	State Council	13th Five-Year National Strategic Emerging Industries Development Plan	《“十三五”国家战略性新兴产业发展规划》
2016/11	State Council, CMC	People’s Republic of China Radio Regulations	中华人民共和国无线电管理条例
2016/11	SASTIND Development & Reform Commission	Guiding Opinions on Accelerating the Construction and	关于加快推进“一带一路”空间信息

		Application of the “Belt and Road” Space Information Corridor	走廊建设与应用的指导意见
2016/12	National Development and Reform Commission	2016 White Paper on China’s Space Activities	《2016 中国的航天》
2017/07	Notice	Sciences and Tech for National Defense Industry 13th 5 Year Development Plan	“十三五”国防科技工业发展规划
2017/12	State Council General Office	Promoting the Deep Development of Military-civilian Integration in National Defense Technology	国务院办公厅关于推动国防科技工业军民融合深度发展的意见
2018/02	National Geographic Information Bureau	2018 year Surveying Geography Information Work Points	2018 年测绘地理信息工作要点
2018/04	Ministry of Industry and Information Technology	Use of Radio Frequency Resources for Remote Sensing and Space Science Satellites Plan (2019-2025)	遥感和空间科学卫星使用频率规划 (2019-2025 年)
2018/12	State Council, Central Military Commission	Interim Measures on the Management of Remote Sensing Satellite Data Open Sharing	《遥感卫星数据开放共享管理暂行办法》
2019/03	Ministry of Industry and Information Technology	Notice on Further Promoting the Insurance Compensation Mechanism for First (Set) Major Technical Equipment	《关于进一步深入推进首台（套）重大技术装备保险补偿机制试点工作的通知》

2019/05	State Administration of Science, Technology and Industry for National Defense, National Development and Reform Commission, Ministry of Finance	Interim Measures on the Management of National Civil Remote Sensing Data	《国家民用遥感数据管理暂行办法》
2019/07	State Administration of Science, Technology and Industry for National Defense, Central Military Commission Equipment Development Department	Notice on Promoting the Orderly Development of Commercial Launch Vehicles	《关于租金商业运载火箭规范有序发展的通知》
2019/06	NDRC, Ministry of Trade & Commerce	Encouraged Foreign Investment Industry Catalogue	鼓励外商投资产业目录
2021/05	SASTIND	Notice on encouraging the orderly development and increasing secure management of small satellites	关于促进微小卫星有序发展和加强安全管理的通知
2022/01	State Council information bureau	White paper on China's Space Activities in 2021	《2021 中国的航天》白皮书

Annex to Part 3

D. List of launches completed by Chinese Commercial Space Launchers

The following table is sorted by enterprise. The source of the information is the Gunther Space Page.

Launcher enterprise	Date	Launcher model	Launch Status	Launch center	Payload	Function	Orbit	Mass	Constructor	Operator/ Final Client
Landspace	27/10/2018	Zhuque-1	Fail	Jiuquan	Weilai 1	Telecommunication		10-30kg	Minospace	CCTV
Lanspace	14/12/2022	Zhuque-2	Fail	Jiuquan	Zhixing 1B	Earth observation				Smart Satellite Technology
Lanspace	12/07/2023	Zhuque-2	Success	Jiuquan	(Dummy Payload)	Demonstration				
Landspace	08/12/2023	Zhuque-2	Success	Jiuquan	Honghu 1 / Honghu 2 /	Demonstration	433x461km	50kg	Spacety	Shanghai Lanjian Hongqing Keji YG
Landspace	08/12/2023	Zhuque-2	Success	Jiuquan	TY 33	Demonstration		50kg	Spacety	Hunan University of Science and Technology
OneSpace	27/03/2019	OSM-1	Fail	Jiuquan	Lingque 1B					
iSpace	25/07/2019	Hyperbola-1	Success	Jiuquan	CAS 7B / BP 1B) /	Demonstration (amateur radio communication)		3kg		Chinese Amateur Satellite Group (CAMSAT); Beijing Institute of Technology (BIT)
					Hyperbola Stage 4 payloads 1	Demonstration			iSpace	iSpace
					Hangtian KKG Fazhang sat		300x300km (LEO)			Aerospace Science and Technology Space

										Engineering Development Co.
iSpace	01/02/2021	Hyperbola-1	Failure	Jiuquan	(6 satellites ?)					
iSpace	03/08/2021	Hyperbola-1	Failure	Jiuquan	Jilin-1 Mofang-01A	Earth observation		18kg	CGSTL	CGSTL
iSpace	13/05/2022	Hyperbola-1	Success	Jiuquan	Jilin-1 Mofang-01A(R)	Earth observation		18kg	CGSTL	CGSTL
iSpace	07/04/2023	Hyperbola-1	Success	Jiuquan	Lianyungang (Dummy Payload)	Demonstration (vehicle evaluation)			iSpace	iSpace
iSpace	16/12/2023	Hyperbola-1	Success	Jiuquan	Liangxi (DEAR 1)	Demonstration	Low Polar		AZSPACE	AZSPACE
iSpace	10/07/2024	Hyperbola-1	Failure	Jiuquan	Yunyao-1 15 / Yunyao-1 16 / Yunyao-1 17	Earth Observation (Meteorology)			Yunyao areospace	Yunyao aerospace
Space Pioneer	02/04/2023	Tianlong-2	Success	Jiuquan	Jinta	Earth observation	8kg		Hunan Hangsheng Satellite Technology	Hunan Hangsheng Satellite Technology

OrienSpace	11/01/2024	Yinli-1	Success	Dong Fang Hang Tian Gang (barge), Yellow Sea	Yunyao-1 18 / Yunyao-1 19 / Yunyao-1 20	Earth Observation			Yunyao areospace	Yunyao areospace
Galactic Energy	07/11/2020	Ceres-1	Success	Jiuquan	Tianqi 11	Telecommunication (Communication M2M/IoT)	500km SSO	50kg	Shanghai ASES Spaceflight Technology	Guodian Gaoke
Galactic Energy	07/12/2021	Ceres-1	Success	Jiuquan	Jinzijing 5	Earth observation			Starwiz (Zhongke Xingrui)	Hong Kong Aerospace Technology Group Limited (HKATG).
					Jinzijing 1-03	Earth observation			Starwiz (Zhongke Xingrui)	Lingzhong Kongjian Jishu (Beijing Zero G Lab)
					Tianjin Daxue 1	Earth Observation (Infra Red remote sensing)			CGSTL	
					Lize 1	Demonstration (Scientific Experiment)			Spacety	

					Baoyun	Demonstration (Scientific Experiment)		20kg	Spacety	Tianjin Yunyao Aerospace Technology Co., Ltd.
Galactic Energy	09/08/2022	Ceres-1	Success	Jiuquan	Taijing-1 01 / Taijing-1 02 /	Earth Observation (Optical remote sensing)			Minospace	Minospace
					Donghai 1					
Galactic Energy	16/11/2022	Ceres-1	Success	Jiuquan	Jilin-1 Gaofen-03D-08, 03D-51, …, 03D-54	Earth Observation (Optical remote sensing)	579km (?)	42kg (x5)	CGSTL	CGSTL
Galactic Energy	09/01/2023	Ceres-1	Success	Jiuquan	Xiamen Keji 1	Earth Observation				
					Tianqi 13	Telecommunication (Communication M2M/IoT)		50kg	Guodian Gaoke	Guodian Gaoke
					Tianmu-1 01 / Tianmu-1 02	Earth Observation (Meteorology)			Shenzhen Mofang (MagicCubeSat)	Xiyong Microelectronics Park (CASIC)
					Nantong Zhongxue	Education				Nantong secondary school

Galactic Energy	22/07/2023	Ceres-1	Success	Jiuquan	Qiankun 1 /	Demonstration		200kg	C-Space	C-Space
					Xingshidai 16	Demonstration	486x502km	25kg		Nationstar Aerospace - Satellite China (ADA Chain)
Galactic Energy	10/08/2023	Ceres-1	Success	Jiuquan	Xiguang-1 01	Hyperspectral EO				
					Xi'an Hangtou 06, 88, 104, 112	Earth Observation (Optical remote sensing)				
					Diwei Zhineng Yingji 1					
					Xingchi 1B	Earth observation, technology			Dicelsus Space Technology (Hangzhou) Co., Ltd.	Dicelsus Space Technology (Hangzhou) Co., Ltd.
Galactic Energy	25/08/2023	Ceres-1	Success	Jiuquan	Jilin-1 Kuanfu-02A	Earth observation		230kg	CGSTL	CGSTL
Galactic Energy	05/09/2023	Ceres-1S	Success	Yellow Sea "Defu" (barge)	Tianqi 21, …, 24	Telecommunication (Communication M2M/IoT)		50kg (x4)	Guodian Gaoke	ASES

Galactic Energy	21/09/2023	Ceres-1	Failure	Jiuquan	Jilin-1 Gaofen-04B	Earth Observation (Optical remote sensing)			CGSTL	CGSTL
Galactic Energy	04/12/2023	Ceres-1	Success	Jiuquan	Tianyan 16 /					
					Xingchi-1 01A				Ellispspace	Ellipspace
Galactic Energy	29/05/2024	Ceres-1S	Success	DF Hangtian Gang	Tianqi 25, …, 28	Telecommunication (Communication M2M/IoT)		50kg (x4)	Guodian Gaoke	ASES
Galactic Energy	30/05/2024	Ceres-1	Success	Jiuquan	Jiguang Xingzuo 001 / Jiguang Xingzuo 002	Demonstration				
					Yunyao-1 14 / Yunyao-1 25 / Yunyao-1 26	Earth Observation (Meteorology)				
Galactic Energy	06/06/2024	Ceres-1	Success	Jiuquan	TEE 01B /	Earth observation	545km			Mumei Xingkong Keji
					Naxing 3A / Naxing 3B	Earth observation, technology			Tsinghua University	Tsinghua University
					Eros 1					

Galactic Energy	29/08/2024	Ceres-1S	Success	Jiuquan	Yunyao-1 15, 16, 17 /	Earth Observation (Meteorology)				
					Jitianxing A-03 /					
					Suxing 1-01 /					
					Tianfu Gaofen 2					
CAS SPACE	27/07/2022	Lijian-1	Success	Jiuquan	SATech 01 /	Demonstration	500km SSO	622kg		
					GDMTSW or Guidao Daqimidu Tance Shiyan	Demonstration		42kg		
					Jinan-1	Demonstration		94kg		
					DZS 1, 2	Demonstration		95kg (combined)	CAS	CAS
					Huawan-Nanyue Kexue	Demonstration			SAST	Nanyue

CAS SPACE	07/06/2023	Lijian-1	Success	Jiuquan	Shiyan 24A, 24B /	Demonstration				
					Fucheng 1	Earth Observation (SAR Radar observation)		300kg	Spacety	Mianyang
					Xi'an Hangtou 8	Earth Observation (Optical remote sensing)				
					X Shexian Pianzheng Lifang	Astronomy				
					TY 26 /	Demonstration			Spacety	Spacety
CAS SPACE	23/01/2024	Lijian-1	Success	Jiuquan	Taijing-1 03 /	Earth Observation			Minospace	Minospace
					Taijing-2 02	Earth Observation			Minospace	Minospace
					Taijing-3 02	Earth Observation		240kg	Minospace	Minospace
					Taijing-4 03	Earth Observation (Infra Red remote sensing)		350kg	Minospace	Minospace
ExPace	17/03/2012	Kuaizhou-1T	Success	Jiuquan						

ExPace	25/09/2013	Kuaizhou-1	Success	Jiuquan	Kuaizhou 1	Earth Observation	275x293km			National Remote Sensing Center of China
ExPace	21/11/2014	Kuaizhou-1	Success	Jiuquan	Kuaizhou 2	Earth Observation	288x301km			National Remote Sensing Center of China
ExPace	09/01/2017	Kuaizhou-1A	Success	Jiuquan	Jilin-1 Shipin-03 /	Earth Observation (Optical remote sensing)	351x547km	165kg	CGSTL	CGSTL
					Xingyun S1	Demonstration	656km SSO	2,79kg	NorthWestern Polytechnical University	Xingyun Satellite Co.
					Kaidun 1	Demonstration	656km SSO	2,72kg	Beijing Kaidun Universal Technology Co., Ltd., Beijing MSI Technology Development Co., Ltd.,Nanjing University of Technology	Beijing Kaidun Universal Technology Co., Ltd., Beijing MSI Technology Development Co., Ltd.,Nanjing University of Technology
ExPace	29/09/2018	Kuaizhou-1A	Success	Jiuquan	CentiSpace-1 S1	Demonstration	695x708km	97kg	CAS Microsat	Future Navigation
ExPace	30/08/2019		Success	Jiuquan	Taizhi 1 (KX 09) /	Demonstration				CAS

		Kuaizhou-1A			TY 1-07 (Xiaoxiang 1-07)	Demonstration		8kg	Spacety	Spacety
ExPace	13/11/2019	Kuaizhou-1A	Success	Jiuquan	Jilin-1 Gaofen-02A	Remote Sensing			CGSTL	CGSTL
ExPace	17/11/2019	Kuaizhou-1A	Success	Jiuquan	KL-Alpha A / KL-Alpha B	Communication	1044kmx 1057km; 1045km x 1431km	70kg; 90kg	CAS Microspace	KLEO Connect
ExPace	07/12/2019	Kuaizhou-1A	Success	Taiyuan	Jilin-1 Gaofen-02B	Remote Sensing			CGSTL	CGSTL
ExPace	07/12/2019	Kuaizhou-1A	Success	Taiyuan	HEAD 2A / HEAD 2B /	Telecommunication (Communication M2M/IoT)	495x511km	45kg	SAST	HEAD
					TY 16 / TY 17	Earth Observation			Spacety	Spacety
					Tianqi 4A / Tianqi 4B	Telecommunication (Communication M2M/IoT)		8kg	Guodian Gaoke	Guodian Gaoke
ExPace	16/01/2020	Kuaizhou-1A	Success	Jiuquan	Yinhe 1	Telecommunication	621x638km	227kg	SAST	Galaxy Space
ExPace	12/05/2020	Kuaizhou-1A	Success	Jiuquan	Xingyun-2 01 /	Telecommunication		93kg	CASIC	Xingyun Satellite Co.

					Xingyun-2 02					
ExPace	12/09/2020 F	Kuaizhou-1A	Failure	Jiuquan	Jilin-1 Gaofen-02C	Earth observation			CGSTL	CGSTL
ExPace	27/09/2021	Kuaizhou-1A	Success	Jiuquan	Jilin-1 Gaofen-02D	Earth observation			CGSTL	CGSTL
ExPace	27/10/2021	Kuaizhou-1A	Success	Jiuquan	Jilin-1 Gaofen-02F	Earth observation			CGSTL	CGSTL
ExPace	24/11/2021	Kuaizhou-1A	Success	Jiuquan	Shiyan 11	Demonstration	489 km × 502 km 130kg (x2)			
ExPace	15/12/2021 F	Kuaizhou-1A	Failure	Jiuquan	GeeSAT 1-(01) / GeeSAT 1-(02)	Telecommunication (navigation, communication)		130kg	Geespace	Geespace
ExPace	22/06/2022	Kuaizhou-1A	Success	Jiuquan	Tianxing 1	Demonstration	278 km × 291 km			
ExPace	23/08/2022	Kuaizhou-1A	Success	Xichang	CX 16A / CX 16B	Demonstration			CAS, SAST	CAS, SAST
ExPace	06/09/2022	Kuaizhou-1A	Success	Jiuquan	CentiSpace-1 S3 / CentiSpace-1 S4	Demonstration	695x708km	97kgx2	CAS Microsat	Future Navigation

ExPace	24/09/2022	Kuaizhou-1A	Success	Taiyuan	Shiyan 14 / Shiyan 15					
ExPace	22/03/2023	Kuaizhou-1A	Success	Jiuquan	Tianmu-1 03, …, 06	Earth Observation (Meteorology)			Shenzhen Mofang (MagicCubeSat)	Xiyong Microelectronics Park (CASIC)
ExPace	09/06/2023	Kuaizhou-1A	Success	Jiuquan	Longjiang 3	Demonstration (Technology, communication)			Harbin Institue of Technology	Harbin Institute of technology
ExPace	20/07/2023	Kuaizhou-1A	Success	Jiuquan	Tianmu-1 07, …, 10	Earth Observation (Meteorology)			Shenzhen Mofang (MagicCubeSat)	Xiyong Microelectronics Park (CASIC)
ExPace	14/08/2023	Kuaizhou-1A	Success	Xichang	HEAD 3A, …, 3E	Telecommunication (Communication M2M/IoT)	495x511km	45kg	SAST	HEAD
ExPace	25/12/2023	Kuaizhou-1A	Success	Jiuquan	Tianmu-1 11, …, 14	Earth Observation (Meteorology)			Shenzhen Mofang (MagicCubeSat)	Xiyong Microelectronics Park (CASIC)
ExPace	27/12/2023	Kuaizhou-1A	Success	Jiuquan	Tianmu-1 19, …, 22	Earth Observation (Meteorology)			Shenzhen Mofang (MagicCubeSat)	Xiyong Microelectronics Park (CASIC)
ExPace	05/01/2024	Kuaizhou-1A	Success	Jiuquan	Tianmu-1 15, …, 18	Earth Observation (Meteorology)	278 km × 291 km		Shenzhen Mofang (MagicCubeSat)	Xiyong Microelectronics Park (CASIC)
ExPace	11/01/2024	Kuaizhou-1A	Success	Jiuquan	Tianxing 1-02	Demonstration				

ExPace	10/07/2020	Kuaizhou-11	Failure	Jiuquan	Jilin-1 Gaofen-02E /	Earth observation			CGSTL	CGSTL
					CentiSpace-1 S2	Demonstration	695x708km	97kgx2	CAS Microsat	Future Navigation
ExPace	07/12/2022	Kuaizhou-11	Success	Jiuquan	Xingyun Jiaotong VDES Shiyan	Communciation				Xingyun (CASIC)
ExPace	21/05/2024	Kuaizhou-11	Success	Jiuquan	Luojia 3-02 /	Earth observation		245kg	Wuhan University	Wuhan University
					Chaodigui Jishu Shiyan					
					Tianyan 22					
					Lingque-3 04					
China (Long march) Rocket	17/08/2019	Jielong-1	Success	Jiuquan	Qiancheng 01 /	Earth observation, communication		65kg		Qiansheng Exploration Tech Co.
					Xingshidai 5	Earth observation		10kg	Minospace	Guoxing Aerospace Technology
					Tianqi 2	Telecommunication (Communication M2M/IoT)		8kg	Guodian Gaoke	Guodian Gaoke

China (Long march) Rocket	09/12/2022	Jielong-3	Success	Tai Rui (barge)	Jilin-1 Gaofen-03D-44, …, 03D-50 /	Earth Observation (Optical remote sensing)	579km (?)	42kg (x5)	CGSTL	CGSTL
					Jilin-1 Pingtai-01A-01	Earth observation		15kg	CGSTL	CGSTL
					HEAD 2H	Telecommunication (Communication M2M/IoT)	495x511km	45kg	SAST	HEAD
					Jinzijing 1-05, 1-06					Earth observation Starwiz (Zhongke Xingrui) Hong Kong Aerospace Technology Group Limited (HKATG). Infos gunter space uniquement sur Jinzihing et très imprécis, les informations

										retenues sont de Andrew Jones
					Tianqi 07	Telecommunication (Communication M2M/IoT)		50kg (x4)	Guodian Gaoke	ASES
					Huoju 1	Demonstration		12,8kg	Rocket Pi	Rocket Academy (Taicang)
					CAS 5A / CAS 5B ?	Demonstration (Education, technology, amateur radio)			CAMSAT	CAMSAT
China (Long march) Rocket	05/12/2023	Jielong-3	Success	Borun Jiuzhou	WHJSW 03 ?					
China (Long march) Rocket	03/02/2024	Jielong-3	Success	Borun Jiuzhou	NExSat 1 /	Earth Observation	700km SSO	65kg	National Authorithy of Space Sciences (NARSS) in Egypt in collaboration with Berlin Space Technologies (BST).	NARSS

					DRO L	Demonstration (Technology, navigation)	Lunar retrograde distant orbit (DRO) (planned)		CAS Microsat	CAS
					Weihai 1-01, 1-02	Demonstration (Technology, laser communication)		95kg (x2)	CASIC	CASIC
					Xingshidai 18 / Xingshidai 19 / Xingshidai 20	Earth observation			Minospace	
					Yantai 2					
					Zhixing 2A	Earth observation (radar)			Smart Satellite Technology	Smart Satellite technology
China (Long march) Rocket	03/02/2024	Jielong-3	Success	Borun Jiuzhou	Tianyi 41 / Xingshidai 15 / Xingshidai 21, 22 / Fudan 1 / Tianyan 15 / Jitianxing					

					A01 / Luojia-4 01					

Annex to part 5

E. Commentaries on the Official Websites

This annex presents a comparative overview and qualitative analysis of the official websites of a selection of Chinese commercial space launch enterprises, based on two periods of observation (July 2023 and February 2024). It includes tabulated data on the structure and features of these websites, as well as analytical commentary regarding their organization, discourse, and visual identity. Screenshots and individual pages are archived separately.

1. Private Commercial Space Launcher Enterprises Websites

Private company websites are organized in a relatively similar way. The website address leads to a homepage, and it is possible to navigate between different subpages using a banner containing hyperlinks: About Us, Products and Content, News, etc. We will present the content of the homepages in a cross-sectional and concise manner and provide an analysis in the following subsections.

The organization of the official webpage of the enterprise studied including subpages shows significant resemblances, sometimes strikingly so (see particularly below 'About Us' and 'Products and Services'). It would be interesting to determine whether they entrusted the website development to the same company or if they followed a similar template.

The headings present on the websites are:

	Linkspace	**Landspace**	**SpaceTrek**	**OneSpace**	**iSpace**	**DBA**	**Galactic Energy**	**Space Pioneer**	**Orienspace**	**RocketPi**
Homepage	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
About us	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Products and services	Yes*	Yes	Yes	Yes	Yes	Yes*	Yes*	Yes*	Yes	
News	Yes (not up to date)	Yes	Yes	Yes	Yes	Yes			Yes	
Recruitment		Yes	Yes			Yes	Yes	Yes	Yes	
Order launch		Yes					Yes			
Contact**	Yes				Yes					
Merchandising						Yes	Yes			

Extra information about the enterprise		Yes "Landspace knowledge"					Yes "Documentation center"			

*The websites of the enterprise marked with an asterisk present their products and or services in discrete page each dedicated to one product, ultimately providing similar information.

** although few enterprise have a dedicated "contact" subsection, all enterprises provide means to be contact at the bottom of either of their homepage or of each page.

Whether or not a site is carefully designed, how well it functions, its display capacity, etc., also gives an idea of how advanced a company is, and of the budget, if not the total available, at least the one used for online communication. For example, SpaceTrek's "About Us" page contains several errors in the company's name. Some of the logos and images suggest that the site was set up with limited resources. *A contrario*, it is also plausible, given the evolution of the official webpages between July 2023 and February 2024, that more advanced enterprises tend to personalize more, notably adding video records of their successes, in contrast to more "standard" presentations by the younger enterprises.

a. Home page

The home page of the official website of the enterprises is very similar in terms of structure from one website to the other. It generally acts as a summary of the page, with hyperlinks to various sections.

	Linkspace	**Landspace**	**SpaceTrek**	**OneSpace**	**iSpace**	**DBA**	**Galactic Energy**	**Space Pioneer**	**Orienspace**	**RocketPi**
Sliding Banner			Yes	Yes	Yes	Yes	Yes	Yes		
Fix image and slogan	Yes*								Yes	Yes
Video	Yes		Yes	Yes	Yes		Yes	Yes	Yes	
Products and services		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Other informations about the enterprise, short presentation				Yes*			Yes	Yes		Yes
Chronology		Yes		Yes	Yes					
News, activities		Yes			Yes*	Yes	Yes	Yes	Yes	Yes

Sites		Yes	Yes*	Yes			Yes			
General statements about space industry									Yes	Yes
Sliding text									Yes	Yes
Recruitment		Yes				Yes *	Yes			
Others				R&D -, Work environment			Test videos	Order launch		
Contact		Yes	Yes	Yes* (+friens)	Yes*	Yes	Yes	Yes	Yes	Yes

First of all, we can make a few comments on the organization and visual impression of these pages as a whole. The structure is relatively similar overall. The color scheme of black, white, and blue is also widely shared. Although, as we shall see, some websites display it more than others, images evocative of space and its exploration at large are common, without necessarily having a direct relationship to the concrete products and services offered by the company: images of Earth from space, planets, spacemen. Another visual theme is technology: computer-generated models, interconnected points of light, etc.

Secondly, we can identify differences among the sites of several private companies, some more concrete in their iconography, others more suggestive. This distinction seems to reflect the companies' technological advances.

- Some official company websites use images of launchers or parts of launchers taken in photos or on film. These are the more technologically mature companies, in particular Landspace, Galactic Energy, and iSpace.
- Other companies take a more evocative approach, using computer-generated images to model projected launchers or those under development, or using images that evoke space and its exploration in the broadest sense. This is particularly true of Orienspace and RocketPi, which websites have important similarities: no scrolling banner at the top of the page, scrolling text with a purely decorative effect (as opposed to informative), and generalities about the commercial space sector.
- Deep Blue Aerospace and Space Pioneer, use a mix of computer-generated images and modeling, in addition to test videos in the latter case. These companies are also “in between” regarding their technological advancements

Finally, some sections of the websites have unique features:

- Linkspace's homepage is extremely sober, featuring a video of their latest successful launch, which surmounts the company's slogan. The entire site is only available in English, which is a unique feature of this company. This suggests that Linkspace is primarily aimed at a foreign audience, which is also consistent with what was said in

interviews with this company. It is also consistent with the fact that Linkspace is no longer active on WeChat, a medium aimed at a domestic audience. It must be noted that between the two observation periods (July 2023 and February 2024), a number of websites have acquired an English version.

- Landspace's homepage is the only one to show the presence of facilities outside China on their map.
- OneSpace's homepage features a singular video, in which a a narrator, identified as company founder Shu Chang, presents the company's creation and launches. The face of the narrator is never fully revealed, and a number of scenes appear to be re-enactments by actors or employees (this latter point is not unique to the OneSpace video), creating a rather strange effect. In the middle of the video, a series of Chinese flags appear in close-up, contrasting with the overall discourse and iconography of the private websites studied (the flag and national slogans being rather incidental) but also with the rest of the site, which is aligned with the others. This element of distinction through nationalist/communist iconography can be seen on the "About Us" page, where the company's leaders are shown in photos in a room decorated with red flags.
- OneSpace's official website, in the "Main Page" section, also provides information on the "work environment," elements that are also found in the "Recruitment" section of CAS Space, indicating a recruitment function for the site.

b. About us

The "About us" section is meant for the enterprises to make a presentation of themselves, hence, it is an interesting source to characterize their public discourse.

The "About us" sections of the Chinese private commercial launch enterprises studied also show a set of similar subsections present on several or all websites: a paragraph of presentation; slogans and mottos; presentation of the team; chronology for the enterprise; presentation of facilities over the territory; awards; investors; "friend" websites etc.

	Linkspace	**Landspace**	**SpaceTrek**	**OneSpace**	**iSpace**	**DBA**	**Galactic Energy**	**Space Pioneer**	**Orienspace**	**RocketPi**
Presentation paragraph	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Slogans	Yes	Yes	Yes	Yes			Yes		Yes	Yes
Filials	Yes	Yes	Yes	Yes					Yes	
Team		Yes		Yes		Yes	n			Yes
Chronology		Yes	Yes	Yes			Yes		Yes	Yes
Awards		Yes	Yes	Yes						
Contac		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Friend Websites			Yes	Yes	Yes		Yes	Yes		
Investors			Yes	Yes					Yes	
Extra information about the enterprise				Yes "leadership" linking to news	Yes extra documents		Yes "products", "Videos"			

							“Gallery ”			

A study of both the textual content of the “About us” pages for Chinese private commercial launch enterprises and their visual presentation allow us to characterize them as: 1) promotional; 2) techno-optimistic; 3) oscillating between universalist and nationalist discourse.

Promotional

Official websites are tools for promotion of the enterprises. It is not surprising that the discourse contained in the “About us” sector present the enterprises in a positive light, identifying it - more or less legitimately - as a “first” or announcing ambitious goal of assuming this place, on a national, sometimes international level. The promotional character of the public discourse of private commercial space launcher enterprise should lead us to keep a grain of salt when using this material as a secondary source basis for analysis.

> *“Vision: to build a world first-class commercial space company”*[471][472]

> *“One Space is China's leading rocket technology company. The company has always adhered to the values of "placing the customer at the center, invest continuously in R&D", and has successively carried out R&D, production and market system layout in many places in China.”*[473]

> *“Founded in 2020, OrienSpace is a space transportation company that designs and manufactures launch vehicles and new air and space transportation vehicles. By developing the "Gravity" series of launch vehicles, creating diversified and flight-oriented space transportation products such as single-use, reusable and inhabited series, and rapidly forming a low-cost, scaled-up and convenient launch service capability, the company is committed to becoming the most respected commercial space product and launch service provider in the world, making everyone able to accomplish the dream of spaceflight spaceflight.”*[474]

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[471] “Landspace - About Us Section [LANDSPACE 关于我们],” accessed March 6, 2024, https://www.landspace.com/about.html.
[472] In English and Chinese on the page
[473] “One Space - About Us Section [零壹空间官网],” accessed March 6, 2024, http://www.onespacechina.com/about.
[474] “OrienSpace - About Us Section [东方空间],” accessed March 6, 2024, https://www.orienspace.com/aboutPage.

"Commercial aerospace has unlimited prospects and space. As a member of this rising industry, Deep Blue Aerospace will adhere to a pragmatic, innovative, rigorous and efficient style and aspire to become a promoter of the space transportation industry."[475]

"RocketPi is the most representative enterprise of "Star-Rocket Integration" *in China, and the leader of commercial spaceflight 2.0."*[476]

The majority of "About us section" for the official website of private commercial space launch enterprises studied contain slogans, often presented as a series

Linkspace: "*Our mission: Provide humanity with first class transport service for frequent commute to space"*[477]

Landspace: "*Bring Space Closer*"[478]

One Space: "*Enterprise spirit: Fearlessness Excellence*

Enterprise values: Place Customer at the center Continuously invest in R&D"[479]

Galactic Energy: "*Build the new generation of commercial launch vehicles"* [480][481]

iSpace: "*Company Culture*[482]:

Company Vision Become a global first-class commercial transportation service provider

Mission Enhance the efficiency of space access, contribute to the construction of a strong spacefaring nation

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[475] "Deep Blue Aerospace - About Us Section [深蓝航天]," accessed March 6, 2024, http://www.dbaspace.com/about_s.html.
[476] "About Us - Rocket Pi 关于火箭派 – 火箭派," accessed March 6, 2024, https://rocketpi.space/about-us/.
[477] "Linkspace - About Us Section [Linkspace_about]," accessed March 6, 2024, http://www.linkspace.com.cn/about.html.
[478] "Landspace - About Us Section [LANDSPACE 关于我们]."
[479] "One Space - About Us Section [零壹空间官网]."
[480] "Galactic Energy - About Us Section [星河动力航天]," accessed March 6, 2024, https://www.galactic-energy.cn/index.php/List/cid/10.
[481] In English and Chinese on the page
[482] In English and Chinese on the page

Enterprise Spirit Explore and advance together" [483]

Rocket Pi's slogan differ slightly from the ones of other enterprises, as they are much more oriented towards their concrete technological and business path:

"Integration of *Star and Rocket*

Optimized from three major systems: overall design, power system, and structural system.

Rapid Response 4h

According to the industry's "golden four hours" logic, the biological payload samples arrive at the launch site, so as to achieve lift-off within four hours.

"Returnable" and "Integrated" Characteristics

Spaceships and satellites carrying biological payload devices return to the ground within 14-28 days in orbit, so as to complete biological experiments and production of biological raw materials in space and deliver them to customers. Since biological experiments and production are characterized by small quantities and high frequencies, small rockets launched regularly and at high frequencies will be an important guarantee for realizing this market demand."[484]

Techno-Optimistic/ Universalist Mixed with National Concerns

The "About Us" pages of private commercial space enterprises convey an optimistic vision of technological progress and its potential benefits for people's lives. Several enterprises identify enabling access to space as their mission, highlighting the beneficial outcomes for mankind as a whole.

> *"Founded in January 2014, LINKSPACE is the first private rocket company in China. We focus on rocket VTVL and reusable technology, aiming to provide frequent, reliable and low-cost launch services to the world."*[485]

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[483] "iSpace - About Us Section [星际荣耀]," accessed March 6, 2024, http://www.i-space.com.cn/index.php?m=content&c=index&a=lists&catid=2.
[484] "About Us - Rocket Pi 关于火箭派 – 火箭派."
[485] "Linkspace - About Us Section [Linkspace_about]."

"[Deep Blue Aerospace] was established in 2016. It is a commercial aerospace enterprise with the core business of launch vehicle research and development, production and commercial launch services. Since its establishment, it has been focusing on the development of liquid recyclable launch vehicles and is committed to greatly improving human beings' ability to enter space and reducing the cost of entering space."[486]

"Landspace is committed to the development of fully reusable launch vehicle systems to enhance human access to space."[487]

"We believe that in the not-too-distant future, everyone on earth will enjoy the convenience brought by space resources. Narrowband Internet of Things improves resource utilization and productivity levels, and improves the relationship between people and nature. Broadband Internet makes the world more closely connected and deepens the connections between people. Galactic Energy is committed to providing solutions for low-cost, high-frequency access to space for humans. It also provides surging power for space travel, space transportation, and space resource development, allowing space resources to be more easily integrated into our lives."[488]

"iSpace was established in October 2016. The company is committed to developing excellent commercial launch vehicles and providing systematic launch solutions, providing global commercial aerospace customers with more efficient, better, and more cost-effective launch services to greatly enhance human beings' ability to freely enter and exit space."[489]

The discourses in the presentations of the enterprises show a -sometimes closely linked- mix of universalist discourses with more national concern, featuring mention of national strategies and slogans. It must be noted that the latter are far from systematic, as shown in the excerpts below:

"Space Pioneer is a high-tech enterprise that takes the lead in the development of new generation liquid rocket engines and medium and large liquid launch vehicles in the field of commercial aerospace in China. Born with the wave of global commercial aerospace development, it is based on aerospace and faces the world. It adheres to the principle of

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[486] "Deep Blue Aerospace - About Us Section [深蓝航天]."
[487] "Landspace - About Us Section [LANDSPACE 关于我们]."
[488] "Galactic Energy - About Us Section [星河动力航天]."
[489] "iSpace - About Us Section [星际荣耀]."

"gathering to create elites and building aerospace industry". With the innovative concept of "Pioneer", it implements the corporate mission of "promoting the fifth transportation revolution of mankind" and is determined to bring faster, farther and more economical rail transportation, intercontinental transportation and interstellar transportation services into public life."[490]

"Ideal: moving from the East to space, building space for the East

Mission: Explore a new paradigm for aerospace development and expand the boundaries of mankind

Culture: Rigorous, innovative, collaborative and efficient"[491]

"Enterprises' vision[492]*:*

Inheriting the spirit of two bombs and one star, gathering talents in aerospace technology

Wholeheartedly serve the cause of aerospace and national defense industry

Become a world-class commercial aerospace group"[493]

"SpaceTrek was established in October 2017. It is a minying *commercial aerospace enterprise engaged in the development of system-level aerospace products. With the mission of improving space access efficiency and assisting the construction of aerospace power, adhering to the core corporate spirit of "exploration and common progress", it focuses on providing* innovative *and efficient space carriers, aircraft, defense product design and development and technical consulting services, and is committed to Explore the application of new technologies and new mechanisms in the field of military-civilian integration, and aspire to become a world-class provider of low-risk, low-cost, and quick-response commercial launch vehicle launch services."*[494]

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[490] "Space Pioneer - About Us Section [关于我们 - 天兵科技]," accessed March 6, 2024, http://www.spacepioneer.cc/about.
[491] "OrienSpace - About Us Section [东方空间]."
[492] In both English and Chinese in the text
[493] "One Space - About Us Section [零壹空间官网]."
[494] "Space Trek - About Us Section [星途探索-商业运载火箭发射服务提供商]," accessed March 6, 2024, http://www.spacetrek.cn/company.

4 of the studied Chinese private commercial launch enterprise official website make a mention of the term “innovation” in their “About Us” section. The term is empathized in quotations of Space Trek’s; Deep Blue Aerospace’s; Space Pioneer and Orienspace’s sections above. The notion of “supply chain” and “industry chain” appear in the “About us” section of 4 of the studied Chinese private commercial launch enterprise official websites. Interestingly Space Pioneer inscribe the notion in regional development. As shown in the previous chapter on the regulatory framework for Chinese commercial space activities, this notion is of particular importance to Chinese policymakers. This notion will also be explored in the last chapter on Chinese innovation model.

> *“[Landspace] is committed to building a whole industrial chain of "R&D, manufacturing, testing and launching" centering on medium and large liquid oxygen methane launch vehicles, creating a scientific and technological complex in the field of aerospace, and providing cost-effective and highly reliable aerospace transportation services for the global market. […] Adhering to the principle of "independent mastery of key technologies, independent development of key products, independent control of key processes, and independent construction of key facilities", Landspace has already possessed the ability to deliver the entire industrial chain.”*[495]

> *“At present, [Space Trek] has a perfect R&D system, supply chain system and guarantee service system, with a series of launch-proven product lines, as well as corresponding launch services and technical service capabilities.”*[496]

> *“With Beijing Rocket Research and Development Center, Xi'an Power Research and Development Center, Zhengzhou Comprehensive Test Center and Zhangjiagang Intelligent Manufacturing Base as the strategic starting point, Space Pioneer will make efforts to form a strategic layout of product development of "three aircrafts and two arrows", a space With the strategic starting point of "three machines and two arrows", the product development strategy layout of "three centers and five platforms", the aerospace intellectual manufacturing system, the supply chain system "based on the Yangtze River Delta and radiating to the whole country", and the launch market network "based on the whole of China and facing the whole world", the company aspires to make*

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[495] “Landspace - About Us Section [LANDSPACE 关于我们].”
[496] “Space Trek - About Us Section [星途探索-商业运载火箭发射服务提供商].”

the unique contribution of aerospace people for the great rejuvenation of the Chinese nation and the prosperity of global space economy.[497]

"[Rocket Pi] upgrades the R&D and manufacturing of rockets and spacecraft with the concept of advanced manufacturing industry, and serves customers with the concept of modern service industry. The company centers on the core capability of launch vehicles, makes the microgravity environment in space accessible, and forms a commercial closed loop through "upgrading the earth industry from space"."[498]

What does the "About us section" say about the relation of these enterprises with the state?

What can be observed is that, in terms of discourse and visual identity, corporate websites do not heavily engage with China's political and state institutions, including defense and the Communist Party. Their discourse is primarily promotional and techno-optimistic, lacking significant content regarding national policies.

In regard to what has been said in the English language literature on the topic of Chinese commercial space, namely drawing systematic links between State apparatus, the defense and private commercial launch enterprises, the presence of the State; the CCP and nationalist discourses on official websites for the private commercial launcher enterprises studied is rather subtle, and not consistent from one website to the other.

As shown in the above section, some official campaigns and slogans are broadcast, but in a fashion that can hardly be qualified as systematic: Space Pioneer mentions *"the great rejuvenation of the Chinese nation […]*" and right after *"[…] and the prosperity of the global space economy"*; Landspace, SpaceTrek and Orienspace all make the mention of "dream", which could possibly be a reference to the Chinese Dream, a slogan popularized under the early mandate of Xi Jinping, were it not associated with mankind, respectively: *"Land Your Dream In Space"*; *"Space exploration is the eternal dream of mankind"*; *"realize the dream of making everyone access to space"*.[499]

[497] "Space Pioneer - About Us Section [关于我们 - 天兵科技]."
[498] "About Us - Rocket Pi 关于火箭派 – 火箭派."
[499] "Space Pioneer - About Us Section [关于我们 - 天兵科技]."

There is however one exeption. Space Trek is the only enterprise to mention “the building of a strong Chinese Aerospace” and “civil military integration” on its website. Space Trek is also the only enterprise to mention concrete cooperation with the State and Defense apparatus on R&D projects.

“Type III products have begun to have self-hematopoietic capabilities, and military products have filled the gap. At present, the target missile business has conducted in-depth communication with key businesses and demand parties such as the Equipment Development Department of the Central Military Commission, the Air Force, and the Navy. In the future, it will continue to participate in the Air Force, Navy, etc. to promote the development and ordering of supersonic target missiles, and at the same time actively develop subsonic cruise target missiles. , high subsonic cruise target missiles, supersonic cruise target missiles, hypersonic ballistic target missiles, ballistic target missiles, and multi-purpose target missiles; the suborbital rocket business actively expands on the basis of existing cooperative units and cooperates with the Aerospace Science and Industry IV Cooperation with demand parties such as the Academy, the First Academy of Aerospace Science and Technology, the Chinese Academy of Sciences, universities and other demand parties”[500]

The presence of the State can also be hinted in two “About us” sections that raise the authorization and credential system. This was emphasized in interviews, particularly with Landspace, as a particularly important factor in the company's development and even survival in the early days. Licensing issues are also an important part of the legal corpus discussed in the previous chapter.

“[Deep Blue Aerospace] has obtained national high-tech enterprise certification, weapons and equipment quality management system certification and relevant national confidentiality qualifications.”[501]

“Landspace is the first private launch vehicle company in the country to obtain all access qualifications and the only private launch vehicle company to successfully enter orbit based on its self-developed liquid engine. It adheres to the principle of "independent mastery of key

[500] “Space Trek - About Us Section [星途探索-商业运载火箭发射服务提供商].”
[501] “Deep Blue Aerospace - About Us Section [深蓝航天].”

technologies, independent development of key products, independent control of key processes, and independent key facilities."[502]

3 "About Us" sections present their HR team putting forward their previous work experience in the institutional space sector. The circulation of labor between the state and private sectors is discussed in greater detail at the end of this chapter. The recruitment of skilled labor, a limited resource, is a major competitive issue between different types of companies.

"[Space Trek] currently has a team of 78 people, including 53 people in the R&D team. The core team members are all from the Original Equipment Development Department, Rocket Force, Strategic Support Force, Aerospace Technology Group, and Aerospace Science and Technology Group. The backbone of the Industrial Group, AVIC, Ordnance Group and other institutes, with an average working experience of more than 10 years in related industries, has been responsible for or participated in the research and development tasks of multiple national key models of main battle equipment, aircraft, defense equipment and equipment testing. In aerodynamics It has strong advantages in the research, development and application of ground equipment, guidance, attitude control, ballistics, structural design, electrical synthesis, software development, semi-physical simulation, safety and reliability, and has established a complete equipment development, test identification, quality"[503]

"The core team of Space Pioneer are all senior experts in the industry. The company has hundreds of aerospace front-line technical backbones and management backbones. The average age of team members is 38 years old. 67% of them have senior professional titles and above, and 95% have master's degrees or above. This has gathered a large number of scientific research talents"[504]

"Led by International Academy of Astronautics' Zhuang Fengyuan, former China Aerospace Science and Technology Group Science and Technology Committee Standing Committees' and Satellite Engineer Chief Engineer Min Changning [Rocket Pi], the technical team has its posts basically equipped for each subsystem"[505]

[502] "Landspace - About Us Section [LANDSPACE 关于我们]."
[503] "Space Trek - About Us Section [星途探索-商业运载火箭发射服务提供商]."
[504] "Space Pioneer - About Us Section [关于我们 - 天兵科技]."
[505] "About Us - Rocket Pi 关于火箭派 – 火箭派."

Is is also very interesting to note that, for the latter, the legal team is also mentioned for having set up the "staff shareholding plan", an element that was raised in several interviews and explored in the first part of this chapter.

Among the Chinese private commercial space enterprises studied, four had a "Friend Website" section. This subsection reveals a blend of relationships with national entities, including SOEs, academies, universities, and one local development zone. The composition of these "friend websites" is sometimes surprising, raising questions about the motivations behind mentioning these institutions, as actual partnerships with organizations like NASA, ESA, and U.S. enterprises seem unlikely.

List of "friend websites" for each enterprise mentioning them:

SpaceTrek[506] : CNSA; ESA; NASA; CASC; CASIC; CALT; SPACEX; BLUE ORIGIN

OneSpace[507] : China National Nuclear Corporation (CNNC); China Aerospace Science and Technology (CAST); China Aerospace Science and Industry Corporation (CASIC); Aviation Industry of China (AVIC); China National Arms Industry Corporation (CNAIC); China Shipbuilding Industry Corporation (CSSIC); China National Weaponry and Equipment Corporation (CNAEC); Chinese Academy of Physics (CAPS); China Electronics Technology; (China Electronic Information Corporation (CIEC); China Academy of Rocket Research (CARR) China Satellite Network; Chinese Academy of Science; Harbin Institute of Technology Beijing University of Aeronautics and Astronautics; Northwestern Polytechnical University Beijing Institute of Technology; Chongqing University; Nanjing University of Science and Technology; Nanjing University of Aeronautics and Astronautics; Shanghai University Harbin Engineering University; Nanchang Aviation University; Shenyang University of Aeronautics and Astronautics

iSpace[508] :CNSA; ESA; NASA; CASC; CASIC; CALT, SPACEX; BLUE ORIGIN

Space Pioneer[509] : Zhangjiagang Economic & Technology Development Zone (ZETDZ); CNSA; CASC; CASIC; Qinghua University; Beihang University; SpaceX; BlueOrigin

[506] "Space Trek - About Us Section [星途探索-商业运载火箭发射服务提供商]."
[507] "One Space - About Us Section [零壹空间官网]."
[508] "iSpace - About Us Section [星际荣耀]."
[509] "Space Pioneer - About Us Section [关于我们 - 天兵科技]."

c. Products and Services

The product and service section is presented either as a single page on which the various products and services can be found, or in different sections, each devoted to a particular model.

The presentation of products and services gives a clue as to the relative level of advancement of the companies, ranging from 3D projection to the recording of flights that have already taken place.

This section is also particularly useful as a primary source of information on the models and services produced, under development and planned by these companies. The information contained in these sections has been used to create a table presenting the different models offered by the companies and their respective characteristics in section XX.

The product and service section often contains an animated image of the launcher model with different stages, with a mouse-over revealing additional information on certain parts (stage, engine). A "template" in the presentation that runs across websites: Landspace; OneSpace; Space Pioneer; Spacetrek

Not all products are launchers. Some are electronics. SpaceTrek offers consulting services. Linkspace tells us it is the first company to supply state-owned enterprises.

ZQ-2 | YF-12

朱雀二号(ZQ-2) 运载火箭系统

- 中国首款液氧甲烷运载火箭，第一款实现甲烷运载火箭
- 具备百公斤级研产能，百台百公里级的十型箭体动力系统

产品性能

- 结构：箭体、主激、无气动、无助推一体运载技术发展趋势
- 动力：一体化氧甲烷气发动，推进剂成本降低30%-50%
- 通用：系统标准化、通用化、全箭零部件90%以上

运载能力
4000kg@500km SSO
6000kg@200km LEO

箭体直径
3350mm

起飞质量
268t



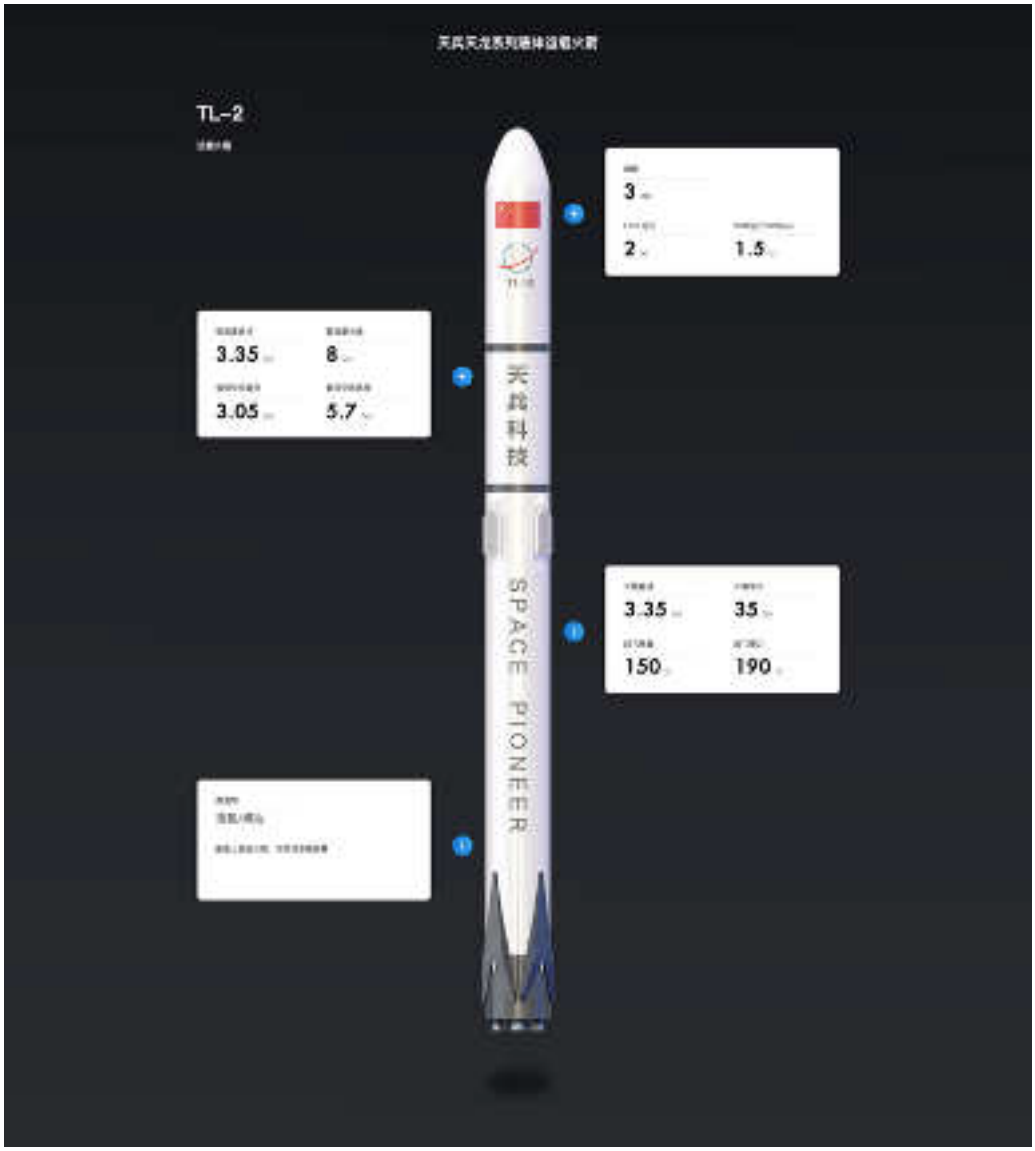
火箭级数
2

推进剂
液氧甲烷

全箭高度
49.5m

整流罩直径
3350mm

起飞质量
219t



d. News and Events

This section contains a selection of current articles on companies. Due to the uneven nature of the information presented in these sections: a very large mass of data for some, a lack of recent updates or even a total absence of information for others, it was decided not to address this section. WeChat is a more relevant medium than company websites for monitoring the latest news and how they are broadcast on commercial space companies, with much more systematic activity on the part of companies, enabling them to be compared with one another.

e. Recruitment

Seven out of ten official websites for private commercial launch enterprises have a section dedicated to staff recruitment. This is an important point to bear in mind as it provides insight into the target audience of these official company websites, particularly potential new

employees, including young people. This will be discussed in greater detail in the final analytical subsection of this chapter.

As with the press sections, the question arises as to how up-to-date these recruitment sections are. A study of the official WeChat accounts of these companies, which regularly publish job offers, usefully complements the data available on their websites.

Total Number of Job Offers per Enterprise:

- OneSpace: 48
- SpaceTrek: 45
- DBA: 43
- Orienspace: 43
- Landspace: 60
- Space Pioneer: 43
- Galactic Energy: 53

2. *ExPace's Website*
    a. *Absence of a Working Website*

At both study points, ExPace did not have a functional website. A search on the Internet Archive revealed traces of such a site at http://ExPace.com.cn/, which was saved on November 15th, 2017. Elements of analysis are provided below regarding the data available through this means.

The absence of an available site at the two study points makes rigorous comparison with other company websites impossible. Additionally, due to presentation modifications by the Internet Archive, it is not possible to comment on the visual identity of ExPace's archived website. This situation puts us in the peculiar position of comparing content on the one hand with an absence of content on the other.

This gives us the opportunity to make several hypotheses and comments:

- The official websites of companies are possibly partly intended for the international public: they ensure a presence on the world wide web, accessible without any particular prerequisites on the part of the reader. The international scope of the site is highlighted by the fact that in the case of ExPace the website, when captured by the Internet Archive in 2017, was only available in English, indicating a focus on the international public. The turning away of ExPace from this channel could suggest a decreased emphasis on reaching an international audience.
- The possible lesser importance given to the international public could be analyzed as a more decided orientation of the discourse towards a national audience. Indeed, ExPace is, by contrast, the most active company on WeChat, which implies the use of resources for this purpose. It is possible that the company has made a trade-off in allocating its resources between maintaining a website and financing the human resources necessary

for significant content production on WeChat. In any case, we are faced with a lack of resources allocated to maintaining a presence on the World Wide Web, while there is notable investment in WeChat, which is accessible only to a Chinese-speaking audience with an account.

- In terms of data accessibility, the prolonged inaccessibility of ExPace's official website represents a significant loss, particularly regarding its product section. This contributes to the increasing difficulty in accessing data during thesis research. It is not possible to draw general conclusions about the "group" of SOE subsidiaries, as our case study on launchers includes only one enterprise. However, there is a consistent lack of communication of technical data from ExPace compared to other enterprises, as evidenced by the media studied.
- ExPace is often presented as, and has presented itself in its website as of 2017, a subsidiary of CASIC. This differentiates it significantly from other companies. We could hypothesize that in this configuration, it was deemed unnecessary at some point for such a subsidiary to maintain its own website, given that the parent company already had one. However, this hypothesis is surprising considering the efforts ExPace is making to present itself as a commercial enterprise in its own right.

b. 2012 Archive of ExPace Official Website

An archive for the 2017 version of ExPace official website was found though the "Internet Wayback Machine", the data extracted in March 2024. The official webpage, which was likely closed between 2020 and 2023, was a priori only available in English, and showed an analogous organization to the one of the other commercial space enterprises. Due to alterations in presentation, it is not possible to make comments as to the visual identity of ExPace archived website: typology was possibly modified as well as the framing of pictures, some of the latter and other content could not be saved and are no longer accessible, etc.

The website contained a "Home" and "About us" section, its products were presented under a "KZ-1" and "KZ-11" section; a "News" and "Contact" section were also present. Screenshot for all the pages are available in annex.

Home

The home page is divided into: a sliding banner, "hot news" and and "about us" short presentation and link to the dedicated subpage. The short presentation reads as follow:

> *"Kuaizhou is a brand new series solid launch vehicle (LV), which developed by ExPace Technology co,. Ltd. Currently, the family of LV includes Kuaizhou-1a (KZ-1A) and Kuaizhou-11 (KZ-11). Our primary purpose is to provide low cost, high reliability launch services for leo and sso commercial customers. The KZ-1a vehicle successfully made its first flight in september 2013 and the second filight in november 2014, sending the satellite into a 290km SSO with precise orbit accuracy."*

About us

> *"ExPace Technology Co., Ltd., a subsidiary of China Aerospace Science & Industry Corp., is specialized in R&D, manufacturing and marketing of KUAIZHOU series launch vehicle to provide cost-effective, reliable and accurate commercial launch service for customers all over the world."*

The nature of ExPace as a subsidiary to CASIC is explicitly given at the start of the presentation. The rest of the paragraph shows a figure of speech analogous to the one of private space enterprises, that can be said to be shared among all types of enterprises.

A set of slogans is also present:

> *"Slogan Take the dream and leap into space."*

> *"Value The corporation's commitment to its core value has made it the first commercial launch service provider of national significance."*

The second slogan is present on several pages of the Website, and is rather mysterious as such. We suggest the following hypothesis as to its meaning. In this context "corporation" is most likely to designate CASIC, which corporate nature is "集团", translated in English as "corporation", whereas ExPace is a "有限公司", "company limited". Hence, the slogan could be interpreted as "CASIC's commitment to its core value -which are left undefined but might be "excellence" or "cutting edge" for example- has made it possible for it to -also- become the first commercial launch service provider of national significance", that is to say, aside of already being a leading enterprise on institutional program front.

> *"Future The future is now. Now we are helping to build a better future ever."*

Finally, the About us section contains a chronology of the enterprise. This organization is similar to what has been seen on other official websites of Chinese commercial launcher companies.

Products and Services

Two separate pages are accessible, titled "KZ-1" and "KZ-11". They present the technical characteristics of both launchers. The middle of the page is occupied by a figure representing

the launcher which most likely was interactive, following an identical presentation with several other enterprises. A number of figures are present on the right side of the page.

3. CAS SPACE Website

The CAS Space website was accessed at the first study point in July 2023. However, at the second study point in March 2024, the website was under maintenance.

In its form and content, the official webpage of CAS Space is very similar to the one of the private enterprises. At the main page, access is given to the following subsections under the form of a banner: products; services; about us; news center; recruitment. At the first time of observation, there was an English version available for the Website.

a. Main Page

The main page is constituted of: an evocative video; followed by a simplified animated presentation of the models and a link to products; a map with the geographical repartition of the facilities and a link to the "about us" section as well as contact information.

In terms of color, CAS Space present a majority of blue shades either dark or neon for the background and white for the typography. The Chinese flag is visible on the models of launchers as the only hint of red.

Generally speaking, the website is on the more "concrete" end of the spectrum, displaying a significant amount of information with little to no frills or purely decorative elements. The overall aesthetic of the website is quite modern.

b. Products

The product page is divided in three subsections: a map for projected launchers; a presentation of PR-1 (Lijian 1) ; a section for "in development products" including PR 1A, PR-2, PR-3, PR-3H, close space recoverable science experiment platform, space travel flying machine. For each model, technical specifications are given under the form of a tab in the middle of the page as well as a computer-generated image of the model on the right side.

c. Launch Services

The launch services page features two icons. The first icon, depicting a satellite, is labeled "Schedule Flight" with an "Order" hyperlink beneath it. Clicking this link generates a fill-in

form on the screen. The second icon, labeled “Space Travel,” displays “Coming Soon” with no active hyperlink.

d. About us

The “About us” section is divided in a presentation of enterprise and different facilities; a presentation of the team; “awards and honors”; “intellectual property”; “world culture”.

The first subsection of the about us section consists in a presentation of the enterprise and different facilities. The enterprise is presented as “the first domestic commercial spaceflight enterprise with mixed ownership, founded in December 2018 and headquartered in Nansha, Guangzhou, covering the business scope of serialized launch vehicle research and development, customized aerospace launch, suborbital space tourism etc.” “a platform for converting the results of major national scientific research projects […] relying on the scientific research strength and resource advantages of the Institute of Mechanics of the Chinese Academy of Sciences and the Center for Space Flight Science and Technology”. Thus, the specific corporate nature of CAS Space is the first thing to appear in the company presentation, which is interesting to note in terms of how the company presents itself to the site's audience, and possibly how it sees itself. Unlike private companies, CAS Space does not emphasize its capacity for innovation, but rather its mixed financing model, its role as a "commercial" conversion platform for major national scientific research projects 国家重大科研项目, and the capabilities and resources of the CAS institutes on which it relies.

In terms of its presentation, CAS Space occupies a unique position compared to private companies. It commercializes the outcomes of targeted, publicly-funded research projects conducted by the Institute of Mechanics and the Center for Space Flight Science and Technology of CAS in the commercial market. Not only is the difference of corporate nature of CAS Space explicitly affirmed on its official website, but it is also presented as a strength in order to achieve the objective, similar to the one of private enterprise, of becoming a world-leading enterprise:

> *“Under the guidance of Chinese major strategic needs in the aerospace field and giving full play to the advantages of the new type whole country system and mixed ownership, the company aspires to become an international first-class aerospace enterprise.”*

This first subsection then goes on to present different facilities for the enterprise in Beijing, Guangzhou and Xi’an as well as Flight Technology innovation base and Jiuquan launch center,

which are presented as “wholly owned subsidiaries”. While this does not differ *de facto* with the status of the subsidiaries of private enterprises, the formulation as “wholly owned subsidiaries” is original. This could show a more acute awareness of CAS Space, in its public communication, of questions regarding corporate nature, which would be coherent with the way it presents itself firstly as a mixed-ownership enterprise.

The second subsection of the "about us" section is titled "our team". First, a presentation is given by of head of the company, Yang Yiqiang. As with certain private companies, its experience in the institutional system is highlighted. This is the longest presentation of an individual of all the websites studied, the biographical being accompanied by a significant number of bullet points giving the ranks and titles occupied by the leader.

Second of the subsection “our team” in the “about us section” come more general elements of information on the human resources of CAS Space. One the left, the title “Never fading space people” stands in a handwritten daring typography on a starry background. On the right, a series 4 paragraph revolve around key numbers: Close to 300 people; 60% master degree or above; 40% middle high position; 10 years of experience.

The fourth subsection of the “about us section” is titled “honors and credentials”. It contains a scrolling gallery of images representing certificates with a title underneath.

The fifth “intellectual property” sub-section appears as a scrolling list of icons representing property titles, under which we find the following line : 40+ discovery patents ; 80+ use patents ; 30+ software ; 300+ demands for IP . The “intellectual property” subsection is original and has been found only on CAS official website.

The sixth “world culture” subsection of the site presents the title of the sectionbelow which a first slogan is framed and translated into English "无畏向上，无限可能 - Go above and beyond”. Below, above an evocative computer-generated image consisting of an image of the earth occupying half the screen in front of a starry background, crossed by a CAS rocket, various slogans are shown:

> *“Enterprise Mission – Guide aerospace techniques - Develop space economy - Explore mysteries of the cosmos”*
>
> *“Enterprise philosophy - Use the force of science to change the world - Space science and technology to serve the public/ masses”*

"Core value - Customer first - Innovative Leadership as a basis - Employ talents to their fullest - Create value as a pride"

"Design Philosophy - Simplified and versatile - Advanced and Reliable"

"Quality vision – Efficient quality system – Controlled product guarantee system"

It is interesting to note the mention of quality control, an element that is often quoted in the Chinese specialized literature, as explored in Part I of this dissertation.

"Market vision – The cost determines the market – speed determines winner or loser – Efficiency determines benefit"

As for the slogans used in private commercial space launch enterprises, the slogans present on CAS Space official Website do not stand out. In particular, this last set of slogans presents a liberal vision of space activity, where considerations of cost, speed and efficiency determine the winners and losers, with no notion of state intervention, which could be seen as somewhat contradictory with the content of the previous subsections.

e. Recruitment

The Recuitment page shows 40 offers, divided between "office positions" and "technical positions".

F. Screenshot of WeChat posts

These images serve to illustrate the argument developed in Chapter VIII regarding differentiated communication strategies among minying enterprises, ExPace, and CAS Space, particularly concerning technical information. Posts by minying companies on testing activities—comparable in content to those of CAS Space—tend to highlight the instruments used, often accompanied by numerous detailed images. The texts accompanying the pictures are translated in the Chapter.

By contrast, the example of ExPace's article, although lengthy and also punctuated with visuals, focuses more on the workers and even the surrounding environment. One image notably features cows, likely included to emphasize the remote location of the testing facility where the report was conducted.

The final image is a screenshot from a presentation by CAS Space, illustrating the scientific and pedagogical tone of some of its communications—reflecting the academic orientation of its parent institution.

To highlight the main text and images, the banners at the bottom of the articles linking to other recent publications have been removed.



“Breakthrough R&D Progress on Rocket Pie’s 80 kW Shannon Motor 火箭派‘香农号’火箭发动机 80kW 级电机研发取得突破进展,”

RocketPi, 05/12/2023



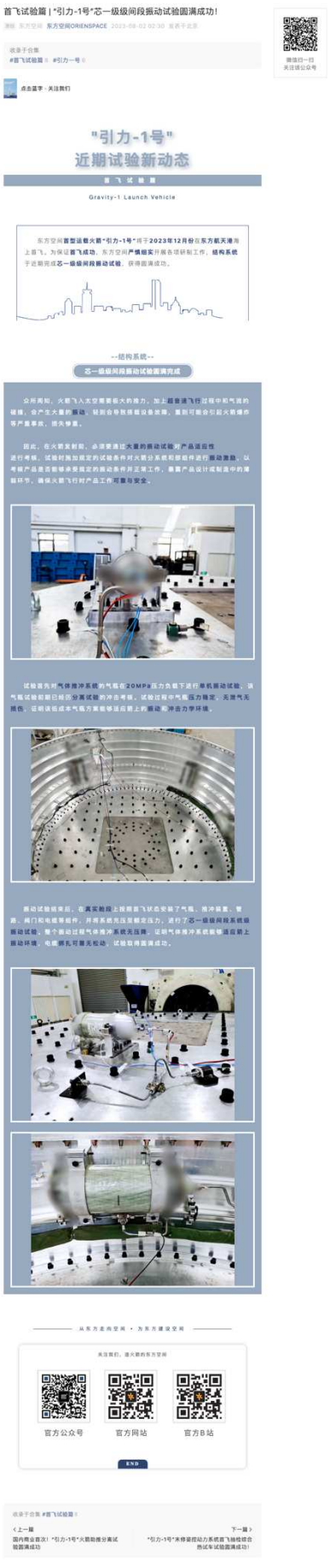
“Interstellar Glory’s Hyperbola-2 Rocket Verification Mission Is a Complete Success iSpace 星际荣耀双曲线二号验证火箭飞行任务取得圆满成功,”

iSpace, 05/12/2023

“420 Seconds! The First Long-Distance Test of Deep Blue Aerospace’s Liquid Oxygen and Kerosene Engine Is a Complete Success!420 秒！深蓝航天液氧煤油发动机首次长程试车圆满成功！”

Deep Blue Aerospace, 05/12/2023





“First Flight Test - Gravity-1’s Core Stage Vibration Test Has Been Successfully Completed! 首飞试验篇 | ‘引力-1 号’芯一级级间段振动试验圆满成功！”

OrienSpace, 02/08/2023



【铸剑·决胜】丨不畏巨浪勇劈波，齐心共闯新航路

航天科工火箭技术有限公司 2023-12-14 12:04 湖北

不畏巨浪勇劈波，齐心共闯新航路

“各号注意，状态检查开始”“21收到”“31收到”“动力负10小时准备好”…“大雪”节气过后气温陡降，山下的大风卷起落叶，裹起团团金黄漩涡，而与窗外形成鲜明对比的是山下技术区内井然有序的设备、队员、口令和火热的键盘敲击声。火箭公司某新型号关键技术验证试验进入最后冲刺期，在公司党委的统一部署下，该试验队成立“劈波辟路”党员突击队，由试验队两总系统作为突击队领导带领全员集结外场试验地，集中火力开展多轮总检查测试和演练，为确保最终试验成功即是全力排万难，为快舟“新航路”的开辟齐心协力勇劈波。

“这里怎么失锁了？”在一轮总检查测试中，松林的一句小声嘟囔在整棚耳边被瞬间“放大”，黎棚迅速警觉起来告诉了同组的城哥和梦堂。从黎棚小组的角度判断，该状况虽不影响本轮测试但极有可能影响后续大试验，此时其他专业组测试还在继续，三人简单讨论后决定上报两总系统。两总系统迅速中止了测试，召集相关专业讨论，经仔细研判和排除，大家基本锁定成因，并研究出两套解决方案：方案一操作短时，在技术区简单调整后，测试可快速继续；方案二涉及携带设备前往试验区验证和操作，可能导致当日测试长时间延迟。

“虽然留给我们的时间不多了，但为确保最后大试验万无一失，当前每轮测试必须充分验证，各环节必须完全托底！”两急也要踢实每一步。突击队领导小组商议后决定执行方案二，派松林上山与试验区的队员对实物进行确认，对猜想进行验证。推开技术区大门，狂风超机裹进几片落叶，屋里的队员们不由得再次收拢领口，此时天色暗下来，雨点加速下落。

松林抵达山顶试验区的时候，大雨已在狂风的裹挟下形成巨浪，一阵阵往人身上“扑”，一批操作手刚刚完成试验区的防雨工作返回休息间，得到又要开空操作的消息，操作手方锦毫不犹豫再度穿戴好安全带，等待与松林一起前往离轮操作区“劈波斩浪”。

"Forging the Sword . Decisive Victory: Fearless Against the Waves, Breaking New Route with One Heart Together”【铸剑·决胜】丨不畏巨浪勇劈波，齐心共闯新航路,”.

ExPace - Party and Mass Work Department, 14 /12/2023

“新航路”的开辟

党群工作部 航天科工火箭技术有限公司 2023-10-18 11:57 湖北

微信扫一扫
关注该公众号



“这是群策群力的时候，每个人的工作经验和生活经验都是有用的。”丁子航正了正帽檐。

这是丁子航入职公司动力技术研究室的第三年。当前正负责公司某关键技术验证试验的试验场调试。**该验证试验是公司某新型号研制项目的核心步骤，是“新航路”开辟的重要一环，技术难度高、涉及要素杂、参与外协多、任务节点紧，一年多来，公司自筹经费、自组力量、自建新试验场锚定目标、即动实干。目前进场在即。**



丁子航一边向小编介绍看场内工作人员，一边试图掸走身上的新鲜黄土：“知道今天你们来，专门换了身新的，没想到刚还是踏脏了”。害羞一笑后，他又快步走向身后的简易板房加入讨论队伍。

1

“有问题现场解决”
——前辈靠前指挥

伴着颠簸山路和嘎嘎鸭叫，几小时前，负责该型号项目的罗哥和刘哥从外省回来还来不及休整就急着行李直赴偏远的试验场，处理前日出现的调试故障。**抵达现场第一步，看实物，第二步才是进屋讨论。**



罗哥和刘哥外省归来即前*“线年”型试验场通勤车





山路颠簸，一路向上

研制进展｜力箭二号液体运载火箭（二）：一级液氧贮箱静力摸底破坏试验取得圆满成功

原创 CAS SPACE 中科宇航 2023年10月12日 10:57

中科宇航 CAS SPACE

精益求精 降本增效

为实现商业化液体运载火箭结构产品降本增效的目标，综合考虑箭体结构产品制造周期内的各项因素，如原材料成本与结构效率的关系，关键产品制造技术的成熟度以及生产效率，结构设计方案对快捷制造工艺性的适应等，基于现有制造技术，并深入融合设计工艺一体化理念，**中科宇航在研的中型液体运载火箭力箭二号构型火箭芯级和助推器贮箱结构采用5A06光筒构型。**

5A06原材料成本低，在同样承载能力下，光筒壁板产品较网格加筋壁板产品的重量有所增加，但由于其最厚处要小于筋条高度，所需原材料厚度更薄。壁板网格铣切是筒段成本的最重要部分，光筒壳可节省这部分加工的成本。光筒壳壁板在制造效率上有了极大的提升，相较于网格加筋结构单块壁板，生产

中科宇航 赞 分享 推荐 写留言

料不需阳极化处理，可节省大量周期。**更换为光筒结构后，单块壁板成形周期可节省数天，对于包含多块壁板的贮箱，制造效率将大幅提升。**

近日，**力箭二号液体运载火箭贮箱采用5A06材料的直径3350mm光筒贮箱顺利完成了静力轴压承载摸底试验**，试验验证力箭二号液体运载火箭贮箱选择5A06材料工艺的可实施性及选择光筒壳结构的合理性。

本次试验采用2000t自平衡加载系统开展轴压静力试验，试验件上下段分别通过边界工装与试验平台进行连接，通过16个150T的油缸同步加载，控制加载精度优于1%FS，通过自平衡加载系统和工装的约束来保证对试验件加载的均匀性。**该试验为破坏试验，目标摸底贮箱承载极限，优化设计，持续提升结构效率。**



图1 | 一级贮箱100%加载使用工况

试验过程中，位移和应变采集数据曲线良好，符合试验前仿真预示结果，无异常情况发生，**试验的破坏载荷符合预期结果，误差小于3.4%。**



图2 | 一级贮箱1185吨破坏失稳

本次试验对力箭二号运载火箭贮箱选用5A06材料的工艺可实施性及光筒壳结构的可行性进行了充分的验证，**试验圆满成功意味着力箭二号运载火箭的贮箱选材及结构形式的论证工作基本完成。贮箱从领料到完成试验，共历时8天，充分验证了5A06光筒贮箱的快捷制造特性。**

力箭二号液体运载火箭

力箭二号是中科宇航在研的一款中型液体运载火箭，用于发射太阳同步轨道、近地轨道、转移轨道：以发射卫星互联网、辐射带研究星座等作为主要任务，运载能力为700km太阳同步轨道5.6吨，近地轨道12吨。

Progress in the development of the Kinetica 2 liquid launch vehicle: destructive static strength test of the first stage liquid oxygen storage tank is a complete success

研制进展｜力箭二号液体运载火箭（二）：一级液氧贮箱静力摸底破坏试验取得圆满成功

CAS Space, 10/12/2023



“Dynamic News | One Year Anniversary of ‘Kinetica’ Maiden Launch, Scientific ‘Innovation X’ Put in Orbit and in Service 动态资讯 | ‘力箭’首飞一周年，‘创新 X’科学航班上线,”

CAS Space, 28/07/2023

Résumé en Français

En accord avec la règlementation de l'école doctorale, la thèse de doctorat est accompagnée d'une synthèse en Français. Celle-ci est composée d'une traduction complète de l'introduction, suivie d'une synthèse chapitre par chapitre. La bibliographie de l'introduction et les annexes correspondent à celles de la thèse.

Introduction

Avant-propos

Lors de la première session d'enquête de terrain pour les recherches de cette thèse de doctorat, à l'occasion de la *China Space Conference* (CSC) 2023, tenue à Hefei, je me suis retrouvée assise à côté d'une femme d'une cinquantaine d'années dans le car qui effectuait la navette entre l'hôtel et le lieu de la conférence, alors qu'une averse s'abattait sur la ville. Elle engagea en souriant une conversation cordiale, me demandant d'où je venais et comment j'avais appris le mandarin. Après m'être présentée, je lui retournai la question, lui demandant pour quelle unité elle travaillait. Le ton de sa voix se fit soudainement froid, elle répondit sèchement : « Une unité pertinente » [相关单位 *xiangguan danwei*] avant de se taire. La conversation s'arrêta là, le reste du trajet se déroula dans un silence rythmé par le bruit des gouttes de pluie contre la vitre.

Sa réponse énigmatique m'est restée en tête. Elle tranchait avec les échanges ouverts et spontanés que j'avais eus depuis mon arrivée, en particulier avec les représentants des entreprises spatiales commerciales présents au salon industriel de la CSC. Elle faisait aussi écho à la réputation largement diffusée des activités spatiales en Chine qui m'inquiétait avant mon départ : celle selon laquelle le secteur serait largement opaque, et y mener des recherches relèverait de l'impossible. Pourtant, cette croyance est précisément remise en question dans ce travail de thèse : elle ne s'applique pas dans les faits à l'ensemble du secteur. Bien que la réponse de la dame de la navette fût volontairement vague et invérifiable, je soupçonne aujourd'hui fortement qu'elle travaillait dans le secteur spatial d'État – aussi qualifié de *traditionnel* – plutôt que dans le nouveau secteur commercial.

« *Les activités spatiales chinoises sont, au mieux, opaques.* »[510] Cette phrase de Kazuto Suzuki, sans doute teintée d'ironie, résume les difficultés d'accès à l'information sur l'organisation institutionnelle des activités spatiales en Chine. La réputation du secteur spatial chinois comme étant opaque et énigmatique s'étend jusqu'à la culture populaire, tant aux Etats-Unis qu'en Chine. Dans *Seul sur Mars* (*The Martian*), c'est un lancement chinois, planifié en secret, qui permet *in fine* de secourir l'astronaute Mark Watney, bloqué sur Mars après l'échec d'une première mission de sauvetage[511]. Dans le premier tome de sa trilogie *Le Problème à trois corps*, Liu Cixin explore les conséquences dramatiques d'un programme spatial militaire classifié mené durant la Révolution culturelle, dans lequel une astrophysicienne traumatisée par l'assassinat de son père par des gardes rouges, Ye Wenjie, entre en contact avec une civilisation extraterrestre hostile[512].

Lors de conférences académiques et de présentations publiques en France, la question revenait fréquemment dans l'auditoire de savoir comment j'étais parvenue à obtenir des informations sur mon sujet de recherche, question posée tant par des professionnels que par des personnes extérieures au secteur spatial. Les réactions allaient de la surprise à la franche suspicion lorsque j'expliquais qu'en réalité, j'étais confrontée à une surabondance de sources écrites, tant primaires que secondaires, et que les entretiens de terrain s'étaient révélés bien moins difficiles que prévu, une fois la barrière linguistique surmontée : certains s'étaient même étendus sur plusieurs heures.

L'existence même d'un secteur spatial commercial en République populaire de Chine (RPC) était régulièrement remise en question par le public lors de ces interventions. Un militaire français à la retraite s'est par exemple appliqué à me démontrer que toutes les entreprises spatiales commerciales chinoises n'étaient que des façades pour des laboratoires militaires, après une présentation de travaux qui visait précisément à démontrer l'inverse.

Un scepticisme similaire transparaît dans une étude menée par Kathryn Walsh, Ian Christensen et Rob Ronci sur les perceptions du secteur spatial commercial chinois parmi les parties prenantes du secteur spatial américain :

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[510] Kazuto Suzuki, "Space Policies of Japan, China and India: Comparative Policy Logic Analysis," 2019, https://www.semanticscholar.org/paper/Space-Policies-of-Japan%2C-China-and-India%3A-Policy-Suzuki-Kazuto/35e5d868d2b44da3762fc8271ab98a6d5f28b406.
[511] Andy Weir, *The Martian*, Reprint édition (New York, NY: Random House Publishing Group, 2014).
[512] Cixin Liu, *The Three-Body Problem*, trans. Ken Liu, Reprint edition (New York: Tor Books, 2016).

« *Sur les quinze entretiens réalisés aux États-Unis dans le cadre de ce projet, quatre personnes étaient certaines que des entreprises spatiales commerciales existaient en Chine, tandis que quatre autres étaient certaines du contraire.* »[513]

« *Un investisseur en capital risque spécialisé dans les investissements spatiaux a directement exprimé ses doutes : Un secteur spatial commercial sans soutien de l'industrie étatique ou tentacules gouvernementaux? Je ne sais pas… Je suis presque sûr qu'il y a un lien avec l'État, d'une manière ou d'une autre.* »[514]

Il est notable que cette même question, l'existence ou non d'un secteur spatial commercial ou d'entreprises privées en RPC, soit également revenue régulièrement lors de mes interactions en Chine, bien que soulevée cette fois par des amis ou des personnes extérieures à l'industrie spatiale. Un cas limite marquant fut celui d'une journaliste d'un média local rencontrée lors d'un terrain préliminaire à la CSC de 2019 à Changsha. Lorsque je lui mentionnai que je menais des recherches sur les entreprises de lancement privées [民营 *minying* en mandarin], elle ouvrit grands yeux, affirmant que de telles entreprises n'existaient tout simplement pas dans le secteur spatial, ce alors même qu'elle couvrait un événement où un sous-forum entier, le *Commercial Space Industry International Forum*, était dédié au spatial commercial, à un moment où le concept était à son apogée, comme nous le verrons en Partie 1 de cette thèse.

Au sein de l'industrie spatiale chinoise elle-même, l'existence d'un secteur spatial commercial ne fait aucun doute. Sa définition, en revanche, fait l'objet de débats nourris, comme nous le verrons dans la première partie de cette thèse, en particulier au Chapitre II. Le spatial commercial est généralement perçu comme étant plus ouvert que le secteur dit « traditionnel ». Cette distinction a été formulée lors d'une discussion informelle avec un jeune employé d'une entreprise spatiale commerciale, qui observa : « *Quand c'est le secteur public, tout est toujours plus obscur* », remarque qui fit alors écho à ma précédente rencontre dans la navette.

C'est précisément cette plus grande accessibilité des activités spatiales commerciales chinoises qui a en partie justifié le choix de ce sujet de recherche. Après un terrain préliminaire à la CSC de Changsha en 2019, il semblait envisageable de recueillir à la fois des matériaux

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[513] Kathryn Walsh, Ian Christensen, and Bob Ronci, "Lost Without Translation: Identifying Gaps in U.S. Perceptions of the Chinese Commercial Space Sector" (Secure World Fundation, Caelus Fundation, February 2021), https://swfound.org/media/207116/swf_caelus_lost_without_translation_identifying_gaps_in_us_perceptions_of_the_chinese_commercial_space_sector_2021.pdf. p.15

[514] Ibid. p.22

documentaires et des entretiens pour conduire une analyse structurée du segment commercial des activités spatiales en Chine, là où d'autres segments seraient restés beaucoup plus difficiles d'accès. Ce choix pour le spatial commercial par rapport à d'autres sujets lié au spatial a été confirmé par un spécialiste de l'Académie chinoise des sciences (*Chinese Academy of Sciences* CAS) que j'ai interviewé, qui soulignait que d'autres aspects des activités spatiales, notamment ceux liés au secteur militaire, restaient trop sensibles pour faire l'objet d'une étude académique (échange no. 16, voir tableau dans le Chapitre VII).

Par ailleurs, comme le formulent Yan Zhang et Denise Tsang : « *L'industrie spatiale se privatise et évolue rapidement et il est utile de saisir ce moment charnière.* »[515] Comme nous l'explorerons dans cette introduction, le spatial commercial en Chine était, au moment du lancement de cette recherche en 2019, décrit comme en expansion depuis le milieu des années 2010, et constituait déjà un objet d'intérêt croissant dans les analyses spécialisées en anglais.

Le choix a également été fait de se concentrer sur le segment des lanceurs, car les entreprises de lancement commercial offraient un point de départ clair et identifiable, leurs premières tentatives de lancement coïncidant avec le début de cette recherche. Il était donc possible d'en suivre l'émergence et le développement dès les premières étapes.

J'espère que ce travail pourra servir de porte d'entrée pour l'étude d'autres segments des activités spatiales chinoises. Cela pourrait passer par le développement d'outils d'analyse, comme la distinction entre *spatial commercial* et *commercialisation*, qui ouvre des perspectives historiques et institutionnelles dans les années 1970 et 1980. Cela pourrait aussi impliquer une cartographie des institutions clés productrices de sources primaires, identifiées en Partie 2 de cette thèse. De plus, cette recherche a permis de construire un réseau d'enquêtés dans le secteur du spatial commercial, fondé sur la confiance mutuelle. L'un des défis du terrain était d'établir des contacts dans une industrie perçue comme largement inaccessible. Pourtant, il s'est avéré possible de développer des relations de confiance, voire d'amitié, malgré un climat international rendant les échanges interpersonnels particulièrement complexes —une situation mise en évidence dans plusieurs entretiens avec Mathieu Grialou, représentant du Centre National

[515] Yan Zhang and Denise Tsang, "Knowledge and Innovation Within Chinese Firms in the Space Sector," *Journal of the Knowledge Economy* 14, no. 3 (September 1, 2023): 2905–26, https://doi.org/10.1007/s13132-022-00935-w. p.2922

d'Études Spatiales (CNES) auprès de l'Ambassade de France en Chine, ainsi que dans plusieurs rapports d'expertise. [516]

[516] Kathryn Walsh, Christensen, and Ronci, "Lost Without Translation." p.11, Irina Liu et al., "Evaluation of China's Commercial Space Sector" (Institute for Defense Analyses Science & Technology Policy Institute, September 2019), https://www.ida.org/-/media/feature/publications/e/ev/evaluation-of-chinas-commercial-space-sector/d-10873.ashx. p.8

Délimitation du sujet de recherche

Définir et caractériser le spatial commercial dans le contexte Chinois

Cette thèse de doctorat s'intitule : *Le spatial commercial en Chine : politiques, marché et discours dans le secteur des lanceurs*. Ce titre reflète à la fois l'objet, les sources mobilisées et l'organisation des résultats de recherche de cette thèse de doctorat.

Cette étude porte sur des activités spatiales dont l'objectif est l'exploitation de satellites en orbite, à des fins de service : observation de la Terre, télécommunications et navigation. Ces activités peuvent être divisées en plusieurs segments : fabrication de satellites, lancement, exploitation, segment sol et services spatiaux. La fabrication de satellites et le lancement sont parfois qualifiés de secteur « amont » (*upstream*), tandis que l'exploitation des données et les services sont désignés comme des activités « aval » (*downstream*).

Dans cette recherche sur le spatial commercial en Chine, le point de départ n'est pas le terme anglais *commercial space*, mais le terme en mandarin, 商业航天 *shangye hangtian*.

Comme nous le verrons dans la sous-section suivante, la définition du spatial commercial dans le contexte chinois fait l'objet de nombreuses interrogations de la part des auteurs anglophones. Ce constat constitue à la fois le point de départ et la principale motivation de cette thèse : apporter des éléments de réponse à cette question, en s'appuyant prioritairement sur des sources chinoises, autour d'une problématique large. Qu'est-ce que le spatial commercial dans le contexte chinois ? Comment peut-on le caractériser ?

Cette recherche s'efforce d'apporter une réponse en soulignant la nature composite des entreprises et des investisseurs dans le secteur des lanceurs, et en proposant une typologie d'entreprise basée sur les structures de propriété. Pour approfondir cette approche, des analyses quantitatives et qualitatives sont menées dans la thèse.

Une définition possible du spatial commercial en Chine, issue des résultats de cette recherche, serait d'y voir une diversification des investisseurs, incluant les capitaux privés, et des entreprises, y compris des entreprises privées, intervenant dans le segment amont des activités spatiales.

Cette thèse se concentre spécifiquement sur le spatial commercial en République populaire de Chine (RPC), ou Chine continentale, aussi désignée ci-après comme « Chine ». Le choix a été

fait de formuler le sujet comme « spatial commercial en Chine » (*commercial space in China*) plutôt que « spatial commercial chinois » (*Chinese commercial space*), afin de souligner la dimension globale du phénomène *New Space*, au-delà de ses spécificités locales. Comme nous le verrons dans la sous-partie suivante de cette Introduction, une rhétorique persistante tend à présenter les activités spatiales chinoises au sens large comme relevant d'un « autre dangereux » (*threatening other*), posture qui influence aussi la manière dont la littérature anglophone aborde les développements du spatial commercial en Chine.

En effet, la nature ambiguë du terme *shangye hangtian* est souvent présentée comme un phénomène proprement chinois, façonné par les conditions nationales du pays. Ce travail ne cherche pas à nier ces spécificités — au contraire, il s'attache à les décrire en détail —, mais il importe de souligner que cette ambiguïté n'est pas propre au contexte chinois. Dans le monde anglophone également, le terme *commercial space* ne dispose pas d'une définition claire. Xavier Pasco, dans ses travaux sur l'émergence du *New Space* aux États-Unis, a d'ailleurs souligné qu' « *il n'y a pas un mais des New Space* », insistant sur la nature plurielle et contestée du concept, même au sein des acteurs américains.

Il est également probable que le terme mandarin *shangye hangtian*, bien que traduit littéralement « spatial commercial », soit en réalité un faux-ami, qu'il serait plus approprié de le traduire par *New Space* dans le contexte chinois. Cette hypothèse est renforcée par la fréquence avec laquelle les auteurs chinois comparent ce phénomène aux développements récents aux États-Unis, en particulier l'émergence de *SpaceX*. Alors que la chronologie, à partir du milieu des années 2010, et la nature du phénomène, notamment l'émergence d'acteurs privés dans le segment amont, coïncident avec la dynamique du *New Space*, l'expression [新空间 *xin kongjian*], qui en serait la traduction littérale, n'a jamais été observée dans les sources chinoises mobilisées dans cette recherche pour désigner des activités se déroulant en Chine.

Dans l'usage courant du terme en Chine, le spatial commercial s'oppose au spatial dit *traditionnel*, caractérisé par la prédominance des programmes institutionnels à vocation *a priori* non économique, tels que les missions scientifiques, les programmes d'exploration de l'espace lointain, ou encore les activités de défense. Ces activités s'inscrivent dans le cadre de programmes à long terme, financées par des budgets publics, et coordonnées au plus haut

niveau de l'appareil d'État. Bien que leur fonctionnement interne soit difficile à documenter, plusieurs publications académiques et rapports spécialisés en ont proposé des analyses[517]

Sur le plan industriel, le spatial traditionnel renvoie à deux conglomérats étatiques majeurs : la China Aerospace Science and Technology Corporation (CASC) et la China Aerospace Science and Industry Corporation (CASIC). Ces deux entités, qui emploient chacune plus de 100 000 personnes (CASC revendiquait environ 170 000 employés en 2020[518], CASIC 150 000[519]), sont subdivisées en académies spécialisées, fonctionnant comme des pôles semi-autonomes. Par exemple, la Shanghai Academy of Spaceflight Technology (SAST), aussi appelée Huitième Académie de la CASC, est en charge de plusieurs modèles de lanceurs, tandis que la Quatrième Académie de la CASIC (China Aerospace Sanjiang Group) développe les lanceurs Kuaizhou.

Une distinction entre ces deux groupes a été résumée, lors d'un entretien de terrain, par une formule ironique : « *CASC transporte des hommes, CASIC leur apporte des désastres* » [航天科技是载人，航天科工是灾人 *hangtian keji shi zi ren, hangtiankegong shi zai ren*], soulignant le caractère plus militaire , des activités de la CASIC. Cette impression est renforcée par le fait que les lanceurs Kuaizhou sont conçus à partir de missiles balistiques à propergol solide, bien que les modèles exacts ne soient pas officiellement confirmés. Une autre personne interrogée a résumé la relation entre CASC et CASIC comme une division de pure forme : « Un organe pour deux étiquettes » [一个机构两个牌子 *yige jigou liangge paizi*], suggérant que ces entreprises, initialement conçues pour être concurrentes, se sont en réalité réparti les rôles au sein du paysage spatial national. CASC apparaît néanmoins comme le groupe dominant, avec un portefeuille d'activités plus vaste, allant des vols habités aux satellites d'observation, en passant par les lanceurs lourds (Longue Marche 5, 6, 7), la station spatiale Tiangong, ou encore les missions lunaires Chang'e.

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[517] Isabelle Sourbes Verger and Denis Borel, *Un empire très céleste - La Chine à la conquête de l'espace: La Chine à la conquête de l'espace* (Paris: Dunod, 2008); Patrick Besha, "Policy Making in China's Space Program: A History and Analysis of the *Chang'e* Lunar Orbiter Project," *Space Policy* 26, no. 4 (November 1, 2010): 214–21, https://doi.org/10.1016/j.spacepol.2010.08.005; Marco Aliberti, *When China Goes to the Moon...*, Studies in Space Policy (Springer International Publishing, 2015), https://www.springer.com/gp/book/9783319194721; Brian Harvey, *China in Space: The Great Leap Forward*, 2nd ed., Space Exploration (Springer International Publishing, 2019), https://www.springer.com/gp/book/9783030195878.

[518] "China Aerospace Corporation 'Reveals Its Bottom Line'! Why Is SpaceX, with Only Just over 6,000 Employees, so Strong? [中国航天集团'透底'！仅 6000 多名员工的 SpaceX，为什么这么强？ Zhong Guo Hang Tian Ji Tuan 'Tou Di'! Jin Liu Qian Duo Ming Yuan Gong de SpaceX, Wei Shen Me Zhe Me Qiang?]," *Finance Sina*, August 21, 2024, https://finance.sina.com.cn/roll/2024-08-21/doc-inckitnw4990936.shtml.

[519] CASIC, "CASIC - Enterprise Presentation [中国航天科工集团有限公司 - 企业简介]," accessed April 15, 2025, http://www.casic.com.cn/n12377374/n12378092/index.html.

Il convient ici d'introduire une distinction chronologique. Le phénomène étudié dans cette thèse, identifié comme ayant émergé dans les années 2010, est désigné sous le nom de *spatial commercial*. Il ne s'agit pas d'analyser les activités spatiales commerciales à but lucratif des années 1980 dans le secteur des lanceurs, que nous qualifions ici de *commercialisation*, comme présenté dans l'encadré ci-dessous.

L'usage du terme commercialisation en lien avec les activités de lancement spatial chinoises apparaît dans les années 1980 pour désigner l'entrée des services de lancement Longue Marche sur le marché international. La China Great Wall Industry Corporation (CGWIC), filiale de la CASC est créée en 1980 pour commercialiser les services de lancement et les satellites chinois auprès de clients étrangers. Cette vague de commercialisation aboutit à plusieurs lancements, notamment pour des clients américains. Toutefois, ce phénomène prend brutalement fin dans les années 2000, avec l'introduction des régulations ITAR (International Traffic in Arms Regulations), qui interdisent *de facto* à la Chine d'accéder au marché des lancements de satellites contenant des composants d'origine américaine[520].

Dans cette thèse, les lancements effectués par CGWIC via des fusées Longue Marche pour des clients étrangers seront donc exclusivement désignés par le terme *commercialisation du spatial* (*space commercialization*). Bien qu'ils aient marqué une rupture avec l'économie planifiée et l'orientation stratégique militaire antérieure[521], les acteurs impliqués étaient exclusivement des entreprises d'État, qui ont créé des filiales spécifiquement chargées de vendre les technologies développées en interne sur des financements publics[522].

Le phénomène étudié ici, le *spatial commercial*, est qualifié de nouveau dans les sources anglophones. Son émergence est datée du milieu des années 2010, caractérisée par l'apparition de nouveaux acteurs dont certains sont qualifiés de privés ou nominalement privés. Ces bornes chronologiques sont discutées de manière critique au Chapitre 5.

Cette distinction entre *commercialisation* et *spatial commercial* s'appuie notamment sur les travaux de Liu Yufei, présentés au Chapitre 2. La relation entre les deux phénomènes constitue un axe de recherche prometteur. Par exemple, lors d'un entretien de terrain, un ancien employé

[520] Nathaniel Rome, "China's Space Export Strategy," *Space Policy* 66 (November 1, 2023): 101574, https://doi.org/10.1016/j.spacepol.2023.101574. p.3
[521] See Evan A. Feigenbaum, *China's Techno-Warriors: National Security and Strategic Competition from the Nuclear to the Information Age* (Stanford University Press, 2003)., Chapter 3 "Changing course, 1975-1986", p.71-115.
[522] For more information about this phenomenon, see E. Feigenbaum, op. cit. p.194-198.

du secteur public, alors actif dans une société de courtage en assurance spatiale (Chapitre VII, entretien no 21), affirmait : « *C'est l'échec de la commercialisation spatiale qui a donné naissance au spatial commercial.* » Sheehan établit également un lien entre l'imposition de contrôles à l'exportation américain et l'investissement de l'État chinois dans des technologies à visée applicative, répondant à la demande croissante en infrastructures et services spatiaux[523]. Comme nous le verrons au Chapitre 5, les livres blancs n'établissent pas nécessairement un lien de causalité aussi direct entre la réduction des activités de *commercialisation* des services de vols spatiaux d'une part et l'encouragement de l'entrée de capitaux non étatiques dont privés dans le secteur aval, puis amont des activités spatiales d'autre part, mais suggèrent une chronologie cohérente.

Structure de la thèse

Le titre de cette thèse — *Le spatial commercial en Chine : politiques, marché et discours dans le secteur des lanceurs* — reflète à la fois l'objet d'étude et sa structure.

La Partie 1 est consacrée à l'analyse de la manière dont le spatial commercial est défini dans la littérature spécialisée en mandarin. Les sections suivantes se concentrent plus spécifiquement sur le secteur des lanceurs. Le Chapitre I expose la stratégie de recherche adoptée pour étudier le spatial commercial à travers la littérature spécialisée et académique en mandarin. Il présente également les outils méthodologiques permettant de naviguer dans la base de données académique CNKI (*China National Knowledge Infrastructure*). Le Chapitre II propose une analyse critique d'un échantillon de productions sur le sujet, en situant l'objet de recherche dans son champ discursif et en présentant les cadres interprétatifs mobilisés par différents auteurs.

La Partie 2 présente une analyse des textes réglementaires relatifs aux activités spatiales commerciales, afin d'évaluer comment le développement de ce secteur est encadré par les discours politiques et institutionnels plus larges. Le Chapitre III est dédié à la présentation et à l'étude d'une sélection de textes réglementaires et de politiques publiques réunis par le *Future Aerospace Research Institute*. Le Chapitre IV analyse les dispositions pertinentes des différents Livres blancs successifs sur les activités spatiales chinoises.

[523] Michael Sheehan, "'Did You See That, Grandpa Mao?' The Prestige and Propaganda Rationales of the Chinese Space Program," *Space Policy*, Special Issue: China's Rising Star, Japan's Re-entry: East Asia's Space Security in a Global Context, 29, no. 2 (May 1, 2013): 107–12, https://doi.org/10.1016/j.spacepol.2013.03.003. p.57

La Partie 3 comprend une évaluation du marché du secteur des lanceurs commerciaux chinois, présentée dans le Chapitre V, fondée à la fois sur des données relatives à l'offre et à la demande. Ce chapitre examine également le positionnement des principaux acteurs au sein de cet écosystème en évolution, en distinguant les entreprises *minying* (privées), les filiales issues d'entreprises d'État, et les entreprises à propriété mixte soutenues par l'Académie des sciences de Chine (CAS).

La Partie 4 propose une analyse des données financières d'une sélection d'entreprises commerciales de lanceurs spatiaux. Le Chapitre VI contient une étude des structures actionnariales et de leur évolution entre 2020 et 2023, ainsi qu'une présentation de leur implantation territoriale via des filiales détenues à 100 %.

La Partie 5, identifie et analyse les récits mis en avant par les parties prenantes elles-mêmes. Le Chapitre VII s'appuie sur 30 entretiens de terrain, tandis que le Chapitre VIII repose sur une étude de six mois des publications sur les réseaux sociaux des principales entreprises de lancement commercial.

Cadre théorique et méthodologie de recherche

Le cadre théorique mobilisé dans cette recherche est transdisciplinaire. Il s'appuie sur plusieurs champs des sciences humaines et sociales, en cohérence avec mon parcours académique — en particulier les Science and Technology Studies (STS), les études juridiques et politiques, ainsi que les études chinoises. La méthodologie articule la collecte de sources primaires et secondaires pertinentes en mandarin ; l'analyse qualitative et discursive ; l'analyse quantitative ; et le travail de terrain.

Une méthodologie détaillée est présentée dans les chapitres concernés pour chaque type de source mobilisée, qui inclut : des articles spécialisés en mandarin sur le spatial commercial ; des textes réglementaires relatifs aux activités de lancement commercial ; des données financières concernant la structure de l'actionnariat et la répartition géographique des filiales d'un échantillon de douze entreprises commerciales de lancement ; des entretiens de terrain ; ainsi qu'un suivi de six mois des publications sur les comptes WeChat officiels des entreprises de lancement sélectionnées.

Cette recherche accorde une attention particulière à la rigueur dans le traitement des sources documentaires issues de la RPC, et à la reproductibilité des méthodes employées, notamment à travers l'identification et l'usage de bases de données pertinentes et accessibles publiquement,

comme la *China National Knowledge Infrastructure* (CNKI), *Aiqicha* et *WeChat*, respectivement présentées dans les Chapitres I, VI et VIII. Ce souci, particulièrement marqué au début de mes recherches, s'est cependant heurté à des difficultés croissantes dans l'accès aux plateformes informationnelles, notamment CNKI et Aiqicha.

Le choix délibéré de se concentrer exclusivement sur les sources chinoises découle de la volonté de comprendre le sujet à partir du point de vue des acteurs locaux. Compte tenu des obstacles associés à l'accès à ces sources, notamment les barrières linguistiques, les difficultés méthodologiques, et des restrictions géographiques en ligne plus récentes, ainsi que de l'abondance des matériaux une fois ces obstacles dépassés, cette approche a été jugée susceptible d'apporter une contribution significative à la littérature. L'objectif n'est pas uniquement d'analyser ces sources, mais aussi de documenter et d'expliciter comment une telle recherche peut être menée, au bénéfice d'autres chercheuses et chercheurs travaillant sur des sujets similaires.

Par conséquent, cette thèse n'engage pas une revue approfondie de la littérature anglophone et francophone sur les activités spatiales chinoises dans leur ensemble, tels que les travaux d'Isabelle Sourbès-Verger, Marco Aliberti, Joan Johnson Freese ou Brian Harvey[524]. La revue de littérature ci-dessous se concentre spécifiquement sur les publications anglophones portant sur le spatial commercial en Chine, notamment une série de rapports publiés au début des années 2020.

[524] Isabelle Sourbès-Verger and Denis Borel, *Un Empire Très Céleste - La Chine à La Conquête de l'espace*, Dunod, 2008; Marco Aliberti, *When China Goes to the Moon...*, Studies in Space Policy (Springer International Publishing, 2015), https://www.springer.com/gp/book/9783319194721; Brian Harvey, *China in Space: The Great Leap Forward*, 2nd ed., Space Exploration (Springer International Publishing, 2019), https://www.springer.com/gp/book/9783030195878.

Le spatial commercial dans la littérature anglophone – État de l'art

Cette introduction propose un état des lieux de la littérature en langue anglaise sur le spatial commercial en Chine, qui constitue le point de départ des recherches. Y sont examinés les types d'études qui la composent, les points de convergence, ainsi que les questions et débats récurrents. Les enjeux épistémologiques soulevés par ces travaux sont également mis en évidence. Cette analyse critique est replacée dans un corpus plus large d'auteurs ayant interrogé le traitement des activités spatiales chinoises dans la littérature anglophone. Une clarification préliminaire de certains termes clés liés au secteur spatial commercial chinois est également proposée, suivie d'une explication de la manière dont cette recherche se positionne dans la littérature existante et des contributions qu'elle cherche à apporter.

Cette revue de littérature ne constitue pas un chapitre autonome pour plusieurs raisons. D'une part, comme le soulignent Han et al., le spatial commercial a reçu une attention académique limitée en tant que tel, ce qui se traduit par un corpus réduit de publications scientifiques disponibles[525]. Par ailleurs, les affiliations institutionnelles de certaines productions et leurs méthodes de recherche soulèvent précisément les questions épistémologiques abordées ci-dessous. D'autre part, la démarche fondamentale de cette recherche repose sur l'utilisation de sources chinoises, avec une insistance particulière sur le fait de rendre l'accès à ces matériaux aussi claire et reproductible que possible. Cette posture vise à répondre à un problème identifié par plusieurs auteurs, présenté ci-dessous, à savoir une difficulté d'accès aux sources en raison entre autres de la barrière de la langue. Elle entend également faciliter le travail d'autres chercheurs et chercheuses sur le sujet. Enfin, tenant compte des biais analytiques présents dans un certain nombre d'études en anglais, le choix a été fait de construire d'abord une analyse autonome dans mes travaux de thèse avant d'engager un dialogue avec la littérature existante par la suite.

Le spatial commercial, un sujet émergent dans les sources anglophones

Au départ des recherches de cette thèse de doctorat, au début des années 2020, le thème du *spatial commercial chinois* commençait à émerger et à gagner en visibilité dans un ensemble de publications anglophones[526]. L'intérêt pour les activités spatiales chinoises s'était intensifié,

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[525] Yuexia Han et al., "A PIE Analysis of China's Commercial Space Development," *Humanities and Social Sciences Communications* 10, no. 1 (October 28, 2023): 1–11, https://doi.org/10.1057/s41599-023-02274-w. p.2

[526] Middle format publications include : V. Neel Patel, « China's Surging Private Space Industry Is out to Challenge the US », *MIT Technology Review* (blog), 21 January 2021, https://www.technologyreview.com/2021/01/21/1016513/china-private-commercial-space-industry-dominance/;

porté par une série de réalisations emblématiques de son programme spatial national. Parmi celles-ci, on peut citer les missions lunaires Chang'e 4, ayant abouti à un retour d'échantillons depuis la face cachée de la Lune en janvier 2019, ou encore l'exploration martienne par le rover Zhurong en mai 2021 dans le cadre du programme d'exploration interplanétaire Tianwen. Le vol habité avait également connu des progressions importantes avec le programme Shenzhou, ayant permis la construction et l'exploitation de la station spatiale Tiangong, achevée en 2022. Parallèlement, la Chine a finalisé son propre système global de navigation, Beidou, en juillet 2020, tout en étendant significativement ses constellations de satellites d'observation terrestre et de communication.

Sur le plan commercial, comme le formulent Zhang et Tsang : « *La Chine est désormais perçue comme un acteur potentiel de rupture. Les entreprises étatiques établies, telles que la China Aerospace Science and Technology Corporation (CASC) et la China Aerospace Science and Industry Corporation (CASIC), figurent au classement Fortune Global 500, tandis que des start-ups comme Zhuhai Orbita Aerospace et LinkSure Network ont connu une croissance notable depuis les années 2010.* »[527]

Han Yuexia et al. expriment une idée similaire : « *Le secteur spatial commercial chinois semble rattraper l'occident, en partie grâce au soutien des politiques publiques et à l'implication de capitaux. De nombreuses entreprises émergentes telles que iSpace et Commsat ont connu un développement rapide, en particulier depuis 2015.* »[528]

Le secteur du lancement commercial s'est rapidement imposé comme l'un des aspects les plus visibles de cette industrie spatiale commerciale en plein essor, bénéficiant d'une forte couverture médiatique. Les premières tentatives de lancement orbital par LandSpace et OneSpace se sont soldées par des échecs, respectivement en octobre 2018 et en mars 2019. Beijing Interstellar Glory, alias iSpace, fut la première entreprise à placer un satellite en orbite, le 25 juillet 2019, avant de subir trois nouveaux échecs les 1er février et 3 août 2021, puis le 13

R. Lincoln Hines, « Can China's Commercial Space Sector Achieve Lift off? », *East Asia Forum* (blog), 5 May 2021, https://www.eastasiaforum.org/2021/05/05/can-chinas-commercial-space-sector-achieve-lift-off/; Blaine Interview of Curcio, « Developments in China's Commercial Space Sector » (National Bureau of Asian Research, 24 August 2021), https://www.nbr.org/publication/developments-in-chinas-commercial-space-sector/; Jason Szeftel, « The Space Review: Red Heaven: China sets its sights on the stars (part 2) », *The Space Review* (blog), 21 March 2022, https://www.thespacereview.com/article/4352/1.

[527] Zhang and Tsang, "Knowledge and Innovation Within Chinese Firms in the Space Sector." p.2906

[528] Han et al., "A PIE Analysis of China's Commercial Space Development."p.2

mai 2022. Le 7 décembre 2020 a marqué le deuxième lancement réussi pour une telle entreprise, Galactic Energy.

Parmi les publications de long format consacrées au spatial commercial en Chine, plusieurs rapports se distinguent. Le plus cité est sans doute le rapport de 2019 intitulé *Evaluation of China's Commercial Space Sector*, rédigé par Irina Liu, Evan Linck, Bhavya Lal, Keith Crane, Xueying Han et Thomas Colvin pour le *Science & Technology Policy Institute* de l'*Institute for Defense Analyses*[529]. Ce rapport fait figure de référence dans la littérature spécialisée sur le sujet. Il dresse un panorama du paysage encore naissant mais en expansion du spatial commercial en Chine, propose un cadre politique, distingue plusieurs types d'entreprises commerciales via une typologie, et en décrit les caractéristiques. Il offre également une évaluation des forces, faiblesses et perspectives d'évolution du secteur.

Le *China Aerospace Studies Institute* (CASI), affilié à l'US Air Force, se consacre à l'étude des forces aérospatiales chinoises et de la dynamique civile-militaire qui y est associée. L'Institut a publié deux rapports particulièrement pertinents pour l'étude du spatial commercial en Chine. Le premier, *China 'Private' Defense Enterprises*, rédigé par Andrew Hull et David Markov avec Eric Griffin et publié en 2020, propose une évaluation des risques liés à une sélection d'entreprises spatiales commerciales chinoises, en se fondant sur leur proximité supposée avec l'Armée populaire de libération (APL) [530]. Le second, *China's Space Narrative*, signé par Kevin Pollpeter, Timothy Ditter, Anthony Miller et Brian Waidelich, comporte un chapitre intitulé *Making China Rich: China's Views on Commercial Space and Space Natural Resource Extraction*[531]. Ce chapitre examine les justifications du développement du spatial commercial en Chine, les politiques et réglementations existantes, ainsi que des éléments d'évaluation de marché et certains défis rencontrés par le secteur.

Un autre rapport, publié en 2021 par la *Secure World Foundation* et la *Caelus Foundation*, a été rédigé par Walsh, Christensen et Ronci. Basé sur une revue de littérature et des entretiens menés aux États-Unis et en Chine, ce rapport identifie un certain nombre de « fossés » (*Gaps*)

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[529] Irina Liu et al., "Evaluation of China's Commercial Space Sector."
[530] Andrew W Hull, David R Markov, and Eric Griffin, "'Private' Chinese Aerospace Defense Companies" (China Aerospace Study Institute (CASI), June 2020), https://www.airuniversity.af.edu/Portals/10/CASI/Books/CASI_Chinese_Aerospace_Defense_Companies.pdf.
[531] Kevin Pollpeter et al., "China's Space Narrative - Examining the Portrayal of the Us-China Space Relationship in Chinese Sources and Its Implications for the United States" (China Aerospace Studies Institute, September 10, 2020).

entre les perceptions des acteurs américains du secteur spatial à propos du spatial commercial chinois et l'évaluation produite par les auteurs.[532]

Les quatre rapports présentés ci-dessus constituent la base de l'argumentaire présentée en introduction.

Il convient également de mentionner les rapports de la société de conseil *Euroconsult* (aujourd'hui *Novaspace*), publiés notamment en 2018 et 2020. On peut citer *China Space Industry 2018: A Guide to the Rapidly Evolving Landscape in China's Private and Public Space Industry*[533] et *China Space Industry 2020 edition: A Deep-Dive Analysis of the Current Chinese Space Ecosystem and Future Expected Evolutions*[534]. Bien que ces rapports aient été influents — celui de 2019 de Liu et al. y fait plusieurs références, de même que celui de Walsh et al. en 2021 —, ils ne sont pas accessibles librement et sont vendus à un prix élevé de plusieurs milliers d'euros, ce qui les rend inaccessibles dans le cadre de cette recherche. Les rapports spécialisés sur le spatial commercial chinois mobilisés dans cette Introduction mentionnent également fréquemment la société américaine *BryceTech* (anciennement *Bryce Space and Technology*), spécialisée dans l'analyse du marché spatial et satellitaire[535], ainsi que Space Angels, une société de capital-risque investissant dans l'industrie spatiale et effectuant un suivi des tendances d'investissement à l'échelle mondiale[536].

La figure de Blaine Curcio, fondateur d'*Orbital Gateway Consulting*, société de conseil basée à Hong Kong et partenaire d'Euroconsult, apparaît aussi comme une référence incontournable sur l'industrie spatiale chinoise. Curcio contribue régulièrement à des revues spécialisées et à des événements publics, et édite une lettre d'information régulière sur les activités spatiales chinoises intitulée *China Space Monitor*[537].

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[532] Kathryn Walsh, Christensen, and Ronci, "Lost Without Translation." p.11, Irina Liu et al., "Evaluation of China's Commercial Space Sector" (Institute for Defense Analyses Science & Technology Policy Institute, September 2019), https://www.ida.org/-/media/feature/publications/e/ev/evaluation-of-chinas-commercial-space-sector/d-10873.ashx. p.8

[533] "China Space Industry 2018: A Guide to the Rapidly Evolving Landscape in China's Private and Public Space Industry" (Euroconsult, 2018).

[534] Euroconsult, "China Space Industry 2020 Edition - A Deep-Dive Analysis of the Current Chinese Space Ecosystem and Future Expected Evolutions," May 2020.

[535] "BryceTech," accessed April 2, 2025, https://brycetech.com.

[536] "Space Angels," accessed April 2, 2025, https://www.spaceangels.com.

[537] "The China Space Monitor - About," accessed April 2, 2025, https://chinaspacemonitor.substack.com/about.

Certains articles académiques sont également à mentionner, notamment ceux de Yuan et Peeters[538], Zhang et Tsang[539], Han et al. [540], Nie Mingyan[541], et Zhang et Yang[542].

Enfin, il est important de souligner le travail d'auteurs et d'analystes produisant du contenu dans des formats plus courts ou alternatifs. Bien que ces travaux ne soient pas systématiquement explorés dans cette recherche, ils apportent néanmoins un éclairage précieux sur les activités spatiales commerciales en Chine. Andrew Jones, journaliste pour *SpaceNews*, couvre régulièrement un large éventail d'activités spatiales chinoises, y compris les développements du secteur commercial[543].

Jean Deville, créateur de la chaîne YouTube *DongFangHour*[544] et de l'ancien blog *China Aerospace Blog*, produit régulièrement des vidéos explicatives couvrant divers aspects des activités spatiales chinoises, institutionnelles comme commerciales. Il a également participé à plusieurs rapports d'expertise et coécrit un article académique en français sur les enjeux de main-d'œuvre et de fuite des cerveaux dans les secteurs spatial public et commercial[545].

Mathieu Grialou publie également une lettre d'information mensuelle en français intitulée *Chinespace*, offrant une couverture complète des développements du secteur spatial chinois. Étant donné que ma recherche se concentre principalement sur les sources chinoises, et que le volume de matériau produit est considérable, j'ai choisi de ne pas explorer de manière systématique ces formats, qui représentent cependant des pistes prometteuses pour des recherches futures.

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[538] Yuan Yuan and W. Peeters, "Research Viewpoint: Rapid Growth of the Chinese Commercial Space Sector," *Astropolitics* 17, no. 3 (September 2, 2019): 191–207, https://doi.org/10.1080/14777622.2019.1675430.
[539] Zhang and Tsang, "Knowledge and Innovation Within Chinese Firms in the Space Sector."
[540] Han et al., "A PIE Analysis of China's Commercial Space Development."
[541] Mingyan Nie, "Space Privatization in China's National Strategy of Military-Civilian Integration: An Appraisal of Critical Legal Challenges," *Space Policy* 52 (May 1, 2020): 101372, https://doi.org/10.1016/j.spacepol.2020.101372.
[542] Max Zhang and Xiaonan Yang, "China's Emerging Commercial Space Industry: Current Developments, Legislative Challenges, and Regulatory Solutions," *Acta Astronautica* 202 (January 1, 2023): 9–16, https://doi.org/10.1016/j.actaastro.2022.10.011.
[543] "Space News - Andrew Jones," SpaceNews, April 1, 2025, https://spacenews.com/author/andrew/.
[544] "Dongfang Hour," YouTube, accessed April 15, 2025, https://www.youtube.com/channel/UC3UXwB0UbUIg4z4vssUHPBw.
[545] Jean Deville and Guillaume Thibault, "Will there be a war for talents? Overview of human stakes in the rise of Chinese space sector[La guerre des talents aura-t-elle lieu ? Panorama des enjeux humains dans l'essor du spatial chinois]," *Monde Chinois*, no. 64 (October 2020): 90–105.

Points de convergence

Chiffres d'un secteur en croissance

Les publications anglophones du début des années 2020 décrivent généralement le secteur comme étant en croissance, parfois sur un ton très enthousiaste[546], marqué par une multiplication des créations d'entreprises et des levées de fonds. Cependant, les méthodologies utilisées pour établir ces décomptes varient considérablement et sont rarement détaillées par les auteurs, soulevant des enjeux épistémologiques abordés dans cette sous-section. La circulation des estimations chiffrées repose notamment sur la reproduction de graphiques d'une publication à l'autre, comme l'illustre un diagramme initialement publié sur le *China Aerospace Blog*. Selon cette source, le nombre de start-ups du spatial commercial en Chine était estimé à 55 en avril 2019, pour atteindre 87 en juin de la même année[547].

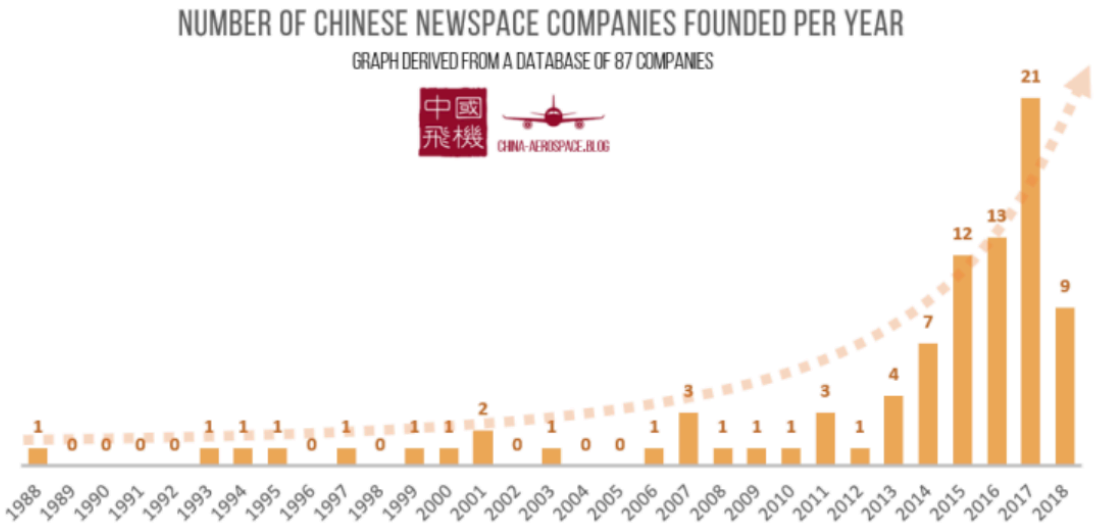

Fig. 3 – Dynamics of NewSpace startup creations year by year

En 2019, le rapport mentionné plus haut de Liu et al. pour l'IDA recensait pour sa part 78 entreprises du spatial commercial en Chine, « *actives dans les segments de fabrication de*

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[546] Hongpei Zhang, « China's commercial space sector picking up momentum, firms' financing expected to double in 2022: report - Global Times », 19 April 2022, Global Times, https://www.globaltimes.cn/page/202204/1259744.shtml, Andrew Jones, « Chinese Space Launch Startups Attract a Frenzy of Investment », *SpaceNews* (blog), 10 February 2022, https://spacenews.com/chinese-space-launch-startups-attract-a-frenzy-of-investment/.

[547] "A Large Scale Update of the China Aerospace Blog NewSpace Mapping (June 2019 Edition)," *The China Aerospace Blog* (blog), June 10, 2019, https://china-aerospace.blog/2019/06/10/a-large-scale-update-of-the-china-newspace-mapping-06-2019/.

satellites, de lancement, de télédétection, de communication, d'analyse de données et de systèmes sol dans l'industrie spatiale ».

S'agissant du secteur des lanceurs, Blaine Curcio estimait en août 2021 que le nombre d'entreprises impliquées dans la fabrication de lanceurs et de leurs sous-composants avoisinait les 25.[548]

En 2023, Han et al. estimaient que : « *En environ sept ans, plus de trois cents entités commerciales du secteur spatial ont été créées, et des entreprises leaders ont émergé progressivement, ce qui rappelle d'une certaine manière la trajectoire de développement du spatial commercial en Occident.* »[549]

Concernant les levées de fonds, le rapport de Liu et al. (2019) avance : « *Notre meilleure estimation de l'investissement dans le secteur spatial commercial s'établit entre 600 et 900 millions de dollars pour la période 2014–2018.* »[550]

Un extrait du rapport *China Space Industry 2020* d'Euroconsult, largement diffusé par ailleurs, indique : « *Le gouvernement chinois a commencé à libéraliser l'investissement privé dans le secteur spatial en 2014, et depuis, plus de 900 millions de dollars de fonds privés y ont été investis. En ajoutant un volume similaire d'investissements publics, les entreprises commerciales ont levé un total d'au moins 1,85 milliard de dollars depuis 2014.* »[551] Cet extrait s'accompagne d'un graphique retraçant l'évolution des investissements entre 2015 et 2020, ainsi que leur répartition entre financements publics et privés.

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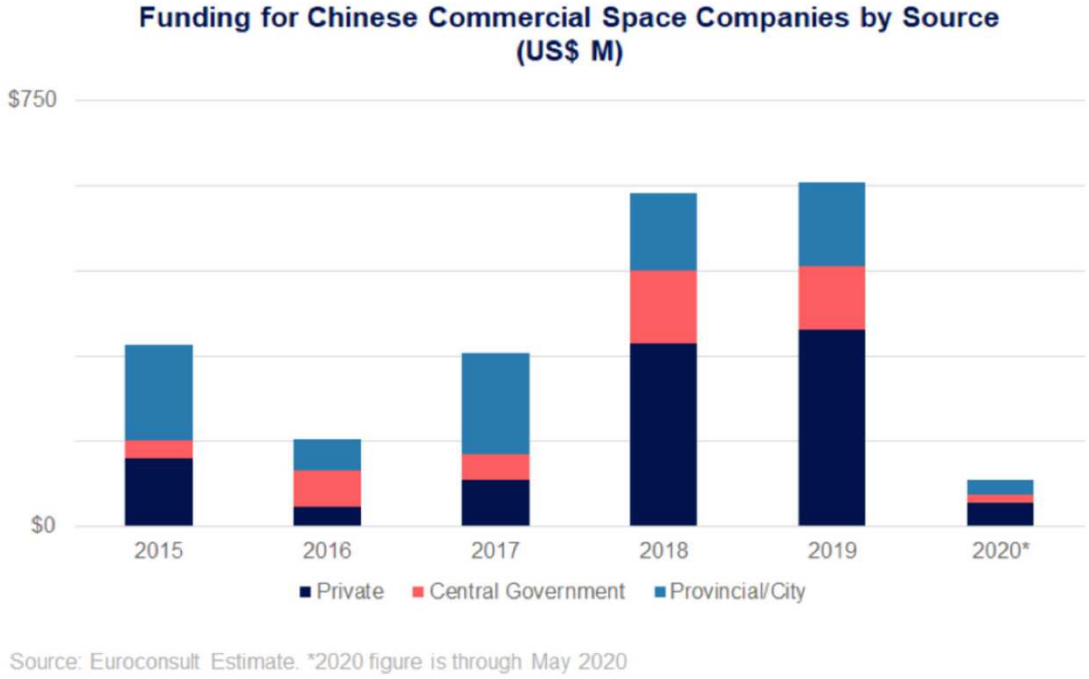
[548] "Developments in China's Commercial Space Sector - Interview of Blaine Curcio."
[549] Han et al., "A PIE Analysis of China's Commercial Space Development." p.2
[550] Irina Liu et al., "Evaluation of China's Commercial Space Sector." p.vi
[551] "Private Investment Fuels China Commercial Space Sector Growth, alongside State-Backed Investment," June 4, 2020, https://www.euroconsult-ec.com/press-release/private-investment-fuels-china-commercial-space-sector-growth-alongside-state-backed-investment/.



Le rapport de 2021 de Walsh et al. s'appuie sur des données issues d'autres rapports spécialisés: « *La société de conseil américaine Bryce Space and Technology rapporte que 314,2 millions de dollars ont été investis dans les entreprises spatiales chinoises en 2019, contre 288 millions en 2018. Les fabricants chinois de satellites auraient levé près de 155 millions de dollars en 2020. […] Euroconsult a rapporté que les entreprises de lancement commercial en Chine avaient levé un total d'environ 530 millions de dollars lors de 8 tours de financement entre 2020 et les deux derniers mois de 2019 ; tandis que les fabricants chinois de satellites ont levé près de 155 millions de dollars en 2020.* [552]» [553]

Concernant le secteur du lancement, iSpace et Landspace ont annoncé avoir levé plus de 170 millions de dollars chacune à l'automne 2020[554]. Galactic Energy aurait levé plus de 200

[552] Quoting "Constellation Watch: China's Incubating Answer to Starlink | Satellite Markets & Research," accessed March 22, 2025, https://satellitemarkets.com/constellation-watch-china-incubating-answer-starlink; Blaine Curcio, "#SpaceWatchGL Opinion: Launching Into the New Decade," *SpaceWatch.Global* (blog), November 29, 2020, https://spacewatch.global/2020/11/spacewatchgl-opinion-launching-into-the-new-decade/.
[553] Kathryn Walsh, Christensen, and Ronci, "Lost Without Translation." p.7
[554] Andrew Jones, "Chinese Space Launch Firm iSpace Raises $173 Million in Series B Funding," *SpaceNews* (blog), August 25, 2020, https://spacenews.com/chinese-space-launch-firm-ispace-raises-173-million-in-series-b-funding/; Andrew Jones, "China's Landspace Raises $175 Million for Zhuque-2 Launch Vehicles," *SpaceNews* (blog), September 9, 2020, https://spacenews.com/chinas-landspace-raises-175-million-for-zhuque-2-launch-vehicles/.

millions de dollars lors de deux tours de financement dans la seconde moitié de l'année 2021[555]. Fondée en 2020, OrienSpace aurait levé près de 50 millions de dollars en mai 2022, tandis que Deep Blue Aerospace aurait obtenu 31 millions en janvier de la même année[556].

L'omniprésence de ces chiffres dans les publications court, moyen et long format offre l'opportunité de soulever un enjeu épistémologique lié à la production des connaissances sur le spatial commercial chinois dans la littérature anglophone, notamment à travers les rapports de conseil, comme détaillé dans l'encadré ci-dessous.

Dans le cadre de mes recherches préliminaires, deux consultants spécialisés dans le secteur spatial — l'un américain, l'autre français — ont été interrogés. Tous deux employés dans des sociétés différentes, ont confirmé utiliser des méthodologies similaires pour établir les évaluations quantitatives figurant dans leurs rapports. Ils ont indiqué qu'il s'agissait en général d'estimations informées, fondées sur des bases de données internes et sur des entretiens réalisés auprès de contacts professionnels issus de leurs réseaux ou de ceux de leurs entreprises. Lorsqu'un troisième cabinet a été contacté pour connaître la méthodologie ayant permis d'estimer la part des investissements chinois dans une évaluation mondiale, il a répondu qu'il ne pouvait la divulguer, celle-ci étant considérée comme « propriétaire ».

Si les graphiques et chiffres publiés dans ces rapports ont l'apparence de résultats définitifs, surtout lorsqu'ils circulent largement ce qui participe à les rendre légitimes, ils ne sont pas accompagnés d'une méthodologie claire sur la manière dont ils ont été produits, reposant essentiellement sur des estimations informées. Cette question épistémologique est liée à la nature même de ces documents, en particulier les rapports de conseil, qui visent à convaincre, s'adressent à un public industriel en quête de réponses concises et claires, et ne font pas l'objet d'une relecture par les pairs. Cela les distingue des articles scientifiques — plus rares sur le sujet — comme ceux de Han et al. ou Zhang et Tsang, qui exposent explicitement leur méthodologie et les procédures de collecte et de traitement des données.

[555] Andrew Jones, "China's Galactic Energy Raises $200 Million for Reusable Launch Vehicle Development," *SpaceNews* (blog), January 24, 2022, https://spacenews.com/chinas-galactic-energy-raises-200-million-for-reusable-launch-vehicle-development/.
[556] Andrew Jones, « Chinese Launch Startup OrienSpace Raises $59.9 Million in Series A Round », SpaceNews, 20 May 2022, https://spacenews.com/chinese-launch-startup-OrienSpace-raises-59-9-million-in-series-a-round/.

L'un des objectifs de cette thèse est précisément de clarifier les sources mobilisées, leurs limites, ainsi que les méthodes de calcul utilisées, notamment dans l'analyse quantitative de la structure de l'actionnariat des entreprises de lanceurs spatiaux, présentée au Chapitre VI.

Une critique particulièrement illustrative à cet égard figure dans le chapitre consacré au *spatial commercial chinois* du rapport du CASI *China's Space Narrative*. Elle vise une estimation de croissance produite par une société de conseil chinoise, *FutureSpace* (désignée dans l'extrait ci-dessous comme « FutureAerospace ») :

« *Les analystes chinois estiment que le marché du spatial commercial en Chine reste modeste, mais anticipent une croissance rapide. Selon FutureAerospace, en 2018, l'investissement et le financement dans le spatial commercial chinois représentaient environ 520 millions de dollars (3,6 milliards de RMB). D'ici 2025, le groupe de réflexion prévoit que la valeur du marché intérieur dépassera 4,4 milliards de dollars (13,6 milliards de RMB pour l'industrie de fabrication de satellites commerciaux et 17 milliards de RMB pour le marché des lancements commerciaux).*

Étant donné la taille encore réduite du secteur et son niveau technologique limité, la prévision de croissance de FutureAerospace apparaît peut-être exagérément optimiste. Le groupe prévoit une forte hausse des lancements de satellites commerciaux, affirmant que la Chine pourrait en lancer jusqu'à 3 100 d'ici 2025. Or, pour atteindre ce chiffre, la Chine devrait lancer plus de 500 satellites commerciaux par an — soit plus que tout autre pays dans l'histoire. En 2019, par exemple, le total mondial de satellites lancés s'élevait à 516. En septembre 2019, la Chine comptait seulement 323 satellites opérationnels, dont 56 commerciaux. En 2018, seuls 25 satellites commerciaux avaient été lancés. En outre, en juillet 2019, un représentant de la CNSA (Administration spatiale nationale chinoise) déclarait que la Chine prévoyait de lancer « près de 100 » satellites d'ici 2025 — un chiffre très éloigné des milliers imaginés par FutureAerospace. »[557]

Le passage ci-dessus critique donc une évaluation jugée trop optimiste des perspectives de croissance pour les investissements liés à l'espace en Chine dans un rapport chinois. Une telle

[557] Pollpeter et al., "China's Space Narrative - Examining the Portrayal of the Us-China Space Relationship in Chinese Sources and Its Implications for the United States." p.34, quoting Pinhe Cultural Investment (Pinhe Wentou; 拼合文投). "Futureaerospace Releases 'Investment in China's Aerospace Sector 2018'." (Weilai Yuhang Yanjiuyuan Fabu "2018 Zhongguo Shangye Hangtian Chanye Touzi Baogao; 未来宇航研究院发布 <<2018 中国商业航天产业投资报告>>). May 17, 2019. www.pinhemedia. com/news/300.html.

critique peut s'expliquer par la position même des cabinets de conseil en général, indépendamment de leur nationalité, qui génèrent des revenus en vendant leurs rapports et analyses sectoriels. En annonçant un marché sur le point de connaître une explosion, ils favorisent le maintien de l'intérêt de leurs clients. Cette posture spécifique d'une partie importante de la littérature anglophone soulève ainsi une question épistémologique — en particulier en l'absence de transparence sur les méthodes de calcul mobilisées.

Le rôle du « Document 60 »

Un autre thème largement partagé dans la littérature anglophone sur le spatial commercial est l'importance accordée aux changements de politique au milieu des années 2010, en particulier à un document souvent désigné par l'expression « Document 60 », dont la mention fait pratiquement l'objet d'un automatisme d'écriture dans les formats courts, bien qu'on la retrouve aussi dans des publications plus académiques.

Il est intéressant de noter que l'étude de Han et al. identifie plutôt la publication du *Plan de développement à moyen et long terme pour les infrastructures spatiales civiles nationales (2015–2025)* comme point de départ du développement du spatial commercial en Chine[558]. Bien que ce document figure dans la compilation de *FutureSpace* présentée au Chapitre III, il est rarement mentionné par les personnes interrogées au Chapitre VII. Ce choix original souligne qu'établir une corrélation directe et automatique entre la publication des *Orientations de 2014* et l'émergence du secteur spatial commercial en Chine est loin d'être évident, et n'est pas universellement admis.

Le rapport de l'IDA adopte une approche plus prudente, plaçant le rôle des *2014 Guiding Opinions* dans un contexte politique plus large et mentionnant plusieurs autres documents pertinents :

« *De nombreux observateurs de l'industrie spatiale chinoise attribuent au "Document 60" l'ouverture officielle du secteur spatial à l'investissement privé, ainsi que l'encouragement à la participation des entreprises privées dans une industrie historiquement dominée par l'État. Bien que le "Document 60" soit le premier document politique émis par le gouvernement chinois incitant explicitement les individus et entreprises privées à mener des activités spatiales, son impact réel pourrait ne pas être particulièrement important. Il n'ouvre que les secteurs de*

[558] Han et al., "A PIE Analysis of China's Commercial Space Development."

la télédétection et du lancement, et ne concerne pas les segments historiquement plus rentables comme les communications par satellite. Plusieurs représentants d'entreprises rencontrés ont déclaré ne pas connaître, ou ne pas avoir prêté attention, au "Document 60" lors de la création de leur entreprise. Certains experts chinois en politique et droit spatial ignoraient également (ou affirmaient ignorer) ce document au moment des entretiens. »[559]

Le rapport du CASI sur les entreprises de défense spatiale chinoises ne fait pas mention d'un « Document 60 », mais utilise le titre complet du texte, à l'instar du chapitre dédié au spatial commercial dans le rapport *China's Space Narrative*, qui mentionne également d'autres politiques influentes[560]. Les cadres analytiques du rapport de Hull et al., comme celui de Pollpeter et al., placent le *spatial commercial chinois* essentiellement sous l'angle de l'intégration civilo-militaire (*Civil Military Integration*, CMI)[561].

Dans cette thèse, il sera évité de faire usage du terme « Document 60 » pour désigner les *Orientations du Conseil des affaires d'État sur l'innovation des mécanismes d'investissement et de financement dans les secteurs clés et l'encouragement de l'investissement social*, préférant l'expression *Orientations de 2014*. L'expression « Document 60 » peut en effet prêter à confusion. D'abord, il ne s'agit pas d'un document non identifié, mais bien de *Guiding Opinions* [指导意见 *zhidao yijian*], une catégorie de textes établie dans la hiérarchie normative de la RPC. Ensuite, le terme « document » peut donner à penser qu'il s'agit d'un texte confidentiel ou d'accès restreint, alors qu'il est publiquement accessible. Enfin, les *2014 Guiding Opinions* s'inscrivent davantage dans un corpus de politiques publiques évolutives que dans une directive unique et déterminante.

Incertitudes autour de la nature du spatial commercial

De nombreux auteurs ayant écrit en langue anglaise sur le sujet du spatial commercial en Chine soulignent la difficulté de définir le terme de *spatial commercial* dans le contexte de la RPC, une question récurrente dans la littérature spécialisée[562]. Cette problématique est abordée à

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[559] Irina Liu et al., "Evaluation of China's Commercial Space Sector." pp.11-20
[560] Pollpeter et al., "China's Space Narrative - Examining the Portrayal of the Us-China Space Relationship in Chinese Sources and Its Implications for the United States." pp.32-33
[561] Hull, Markov, and Griffin, "'Private' Chinese Aerospace Defense Companies," June 2020. p.5
[562] I. Liu and al., Evaluation of China's commercial space sector, Institute for de- fense analyses science & technology policy Institute, September 2019 https:// www.ida.org/-/media/feature/publications/e/ev/evaluation-of-chinas- commercial-space-sector/d-10873.ashx, pp.2e6; J. Deville, A Large Scale Up- date of the China Aerospace Blog NewSpace Mapping (June 2019 Edition), The China Aerospace Blog, 10 June 2019, https://china-aerospace.blog/2019/06/ 10/a-large-scale-update-of-the-china-newspace-mapping-06-2019/; Euro- consult, China Space Industry 2020 edition - A deep-dive analysis of the current Chinese space ecosystem and future expected

partir de sources chinoises dans la première partie de la thèse, notamment au Chapitre II. Il convient toutefois d'apporter dès à présent une clarification, notamment d'ordre historique, quant aux bornes chronologiques du sujet de recherche.

Dans le rapport du *CASI* sur les entreprises de défense spatiale, cette question prend la forme d'une mise en garde, qui fait écho aux doutes exprimés par les personnes interrogées par Walsh et al. au sein de l'industrie spatiale américaine[563] :

« *Les termes "privé" et "commercial" sont ici utilisés dans leur sens le plus générique, c'est-à-dire qu'ils ne désignent pas des entités entièrement détenues par l'État chinois, le Parti Communiste Chinois (PCC) ou l'APL. Bien que ces termes aient des significations et connotations spécifiques pour un public américain, il est important de comprendre que les entreprises opérant en RPC ne sont jamais totalement indépendantes du Parti communiste. Même les entreprises privées doivent posséder un comité du PCC. Par ailleurs, le programme de Fusion civilo-militaire et les lois qui l'accompagnent imposent aux entreprises privées ou commerciales de transmettre toute information, matériel ou technologie requis par l'État sur demande.* » [564]

En réalité, la difficulté définitionnelle s'applique aussi au terme *commercial space* en anglais, comme l'ont souligné Han et al., Walsh et al. et Pollpeter et al. [565] Ce concept ne bénéficie pas d'une définition universellement reconnue, même dans le contexte américain :

« *Le spatial commercial peut être difficile à définir. Certaines définitions restreignent les activités spatiales commerciales à celles menées par des entités du secteur privé qui investissent leur propre capital et fournissent des biens ou services principalement à d'autres entités privées ou au grand public plutôt qu'au gouvernement. D'autres incluent la vente de terminaux à des*

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evolutions, May 2020; L. Laskai, Building China's SpaceX: Military-Civil Fusion and the Future of China's Space Industry Testimony before the U.S.-China Economic and Secu- rity Review Commission (2019), https://www.uscc.gov/sites/default/files/ Lorand%20Laskai%20USCC%2025%20April.pdf, pp. 5e7; China's Ambitions in Space: Contesting the Final Frontier, in 2019 Report to Congress, U.S.-China Economic and Security Review Commission, 2019, https://www.uscc.gov/ sites/default/files/2019-11/Chapter%204%20Section%203%20-%20China%E2% 80%99s%20Ambitions%20in%20Space%20-%20Contesting%20the%20Final% 20Frontier.pdf, pp.375e377; M. Stokes and al., China's Space and Counter- space Capabilities and Activities, U.S.-China Economic and Security Review Commission, 30 March 2020, https://www.uscc.gov/sites/default/files/2020-05/China_Space_and_Counterspace_Activities.pdf, p.74-80.

[563] Kathryn Walsh, Christensen, and Ronci, "Lost Without Translation." p.15 and 22, see above p.1

[564] Hull, Markov, and Griffin, "'Private' Chinese Aerospace Defense Companies," June 2020.p.4

[565] Han et al., "A PIE Analysis of China's Commercial Space Development." p.6, Kathryn Walsh, Christensen, and Ronci, "Lost Without Translation"; Pollpeter et al., "China's Space Narrative - Examining the Portrayal of the Us-China Space Relationship in Chinese Sources and Its Implications for the United States."

consommateurs, même si le système satellitaire appartient à l'État, ou encore des entreprises privées fournissant des services au gouvernement. »[566]

Il est également intéressant de noter que les rapports analysés tendent à présenter la situation chinoise comme une exception, mettant l'accent sur la spécificité du contexte national — notamment en ce qui concerne l'indépendance du secteur privé, la propriété des entreprises et l'influence politique exercée sur celles-ci. À l'inverse, plusieurs auteurs chinois insistent sur l'influence de l'exemple américain dans l'émergence du spatial commercial en Chine, en particulier celle d'Elon Musk, ainsi que sur les liens étroits entre public et privé aux États-Unis, présenté comme un modèle.

En revenant au cadre théorique mobilisé par les critiques de la littérature anglophone sur les activités spatiales chinoises, ce biais pourrait être vu comme une autre facette du processus d'altérisation opéré dans les discours analytiques américains. Ces récits tendent à présenter la Chine comme fondamentalement différente, tout en occultant la dimension internationale, et d'origine américaine, de l'entrée du secteur privé dans l'industrie spatiale, capturée par le terme *New Space*, dont le spatial commercial chinois pourrait être vu comme une déclinaison locale.

Il revient de préciser ici que la présente thèse ne propose pas une analyse spécifique du rôle du Parti communiste chinois en tant qu'acteur distinct, dans la mesure où sa présence explicite n'apparaît que très marginalement dans les matériaux étudiés. Ni la littérature spécialisée en mandarin, ni les sources réglementaires primaires, ni les entretiens de terrain ne faisaient de référence directe au Parti en tant que tel. Les institutions étudiées dans la Partie 2 de cette thèse, dédiée au cadre politique et réglementaire du spatial commercial en Chine, relèvent officiellement de l'État et fonctionnent dans un cadre structurellement lié au Parti communiste. Dans ce contexte, il a semblé moins pertinent d'opposer organes gouvernementaux et instances du Parti que de reconnaître leur articulation étroite dans la production des politiques publiques.

En revanche, le Chapitre VIII de cette thèse met en évidence une présence plus directe du Parti dans la communication institutionnelle de certaines entreprises étudiées, en particulier dans les publications sur WeChat des spin-offs de groupes publics. Celles-ci font apparaître des références explicites au Parti, des évocations répétées d'activités de « construction du Parti », une iconographie ainsi qu'un style narratif épique codifiés. Ces éléments sont commentés dans

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[566] Pollpeter et al., "China's Space Narrative - Examining the Portrayal of the Us-China Space Relationship in Chinese Sources and Its Implications for the United States." p.30

le chapitre concerné, et constituent un marqueur distinctif de la communication propre à l'entreprise spin off de SOE étudiée sur le réseau social.

Typologie des entreprises

Bien que la définition du spatial commercial fasse l'objet de débats, plusieurs auteurs proposent des typologies visant à distinguer les différentes catégories d'entreprises rassemblées sous ce terme générique.

Le rapport de Liu et al. pour l'IDA propose une classification des entreprises spatiales chinoises en quatre catégories : (1) les filiales commerciales d'entreprises publiques (SOEs), (2) les sociétés à capital mixte issues de l'Académie des sciences de Chine (CAS) ou d'universités, (3) les start-ups privées et (4) les compagnies privées établies et leurs filiales se diversifiant vers le spatial[567]

Walsh suggère une typologie différente, distinguant les entreprises issues de programmes spatiaux étatiques (type 1), les spin-offs de l'industrie spatiale traditionnelle (type 2), les entreprises strictement privées (type 3) et les entreprises cotées en bourse (type 4). Bien que la distinction entre les types 1 et 2 ne soit pas totalement claire, les exemples fournis suggèrent que le type 1 fait référence aux entreprises issues de groupes publics comme la CASC et la CASIC, tandis que le type 2 désigne des spin-offs de la CAS[568].

Han et al. proposent également une typologie, distinguant les start-ups établies ou émergentes, les entreprises publiques (SOEs), et les spin-offs de l'Académie des sciences (CAS). Il convient cependant de noter que cette classification ne précise pas si les entreprises publiques mentionnées sont directement impliquées ou si elle concerne uniquement leurs filiales[569].

On observe ainsi un consensus relatif dans la littérature spécialisée autour de l'existence d'au moins trois grandes catégories d'acteurs : (1) les start-ups indépendantes, (2) les entreprises

[567] Irina Liu et al., "Evaluation of China's Commercial Space Sector" (Washington: Institute for Defense Analyses IDA, September 2019), https://www.ida.org/research-and-publications/publications/all/e/ev/evaluation-of-chinas-commercial-space-sector. p.23
[568] Kathryn Walsh, Ian Christensen, and Rob Ronci, "Lost Without Translation - Identifying Gaps in U.S. Perceptions of the Chinese Commercial Space Sector" (Secure World Fundation, February 2021). p.23
[569] Yuexia Han et al., "A PIE Analysis of China's Commercial Space Development," *Humanities and Social Sciences Communications* 10, no. 1 (October 28, 2023): 1–11, https://doi.org/10.1057/s41599-023-02274-w. p.3

affiliées aux conglomérats publics (notamment la CASC et la CASIC), et (3) les entreprises liées à l'Académie des sciences de Chine (CAS).

C'est sur cette base que mes propres recherches ont établi une typologie opérationnelle, appliquée à l'étude de cas des entreprises de lancement commercial. Celle-ci distingue : les entreprises privées ou *minying*, opérées par des capitaux privés ; les spin-offs de groupes publics SOEs (CASC et CASIC) ; les structures à capital mixte, soutenues par des entités affiliées au CAS[570].

La pertinence analytique de cette typologie sera démontrée dans les parties IV et V de cette thèse, qui explorent plus en détail les dynamiques économiques, financières et discursives propres à chacun de ces profils. Pour les entreprises commerciales affiliées à des SOEs, le terme « spin off » est préféré à celui de filiale. En effet, l'analyse de la structure de l'actionnariat de ces entreprises et leur évolution entre 2020 et 2023 démontre la présence et la multiplication de actionnaires extérieurs, il ne s'agit donc pas de filiales détenues à 100%.

Doutes partagés

Accès difficile aux sources chinoises sur le spatial commercial

La difficulté d'accès aux sources est soulignée par plusieurs auteurs, tout en étant accompagnée, dans trois des rapports mentionnés, d'une insistance sur l'importance d'utiliser des matériaux source chinois[571].

Dans le chapitre consacré au spatial commercial chinois du rapport du CASI rédigé par Pollpeter et al., la fiabilité des sources disponibles, qu'elles soient journalistiques ou académiques, est remise en question :

« *Bien qu'il ne manque pas de sources sur les activités spatiales commerciales chinoises, une grande partie des informations sur ces entreprises reste obscure, ce qui rend la vérification difficile et laisse des zones d'ombre dans notre compréhension. De nombreux écrits*

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[570] Lucie Sénéchal-Perrouault, "A Chinese New Space? Commercial launch enterprises within national economic reform," *Entreprises et histoire* 102, no. 1 (May 31, 2021): 149–71, https://doi.org/10.3917/eh.102.0149; Lucie Sénéchal-Perrouault, "Chinese Commercial Space Launchers: Historical Perspective; Policy Framework," *Space Policy* 66 (November 1, 2023): 101572, https://doi.org/10.1016/j.spacepol.2023.101572.

[571] Irina Liu and al., « Evaluation of China's Commercial Space Sector » p.9-11; Pollpeter and al., « China's Space Narrative »p.1-3; Kathryn Walsh, Chris- tensen,andRonci, « Lost Without Translation » p.2-8.Rome, "China's Space Export Strategy." p.2

académiques et articles de presse chinois sur le spatial commercial sont anecdotiques et ne permettent pas de comprendre l'état de l'industrie dans son ensemble. »[572]

Ces remarques font écho aux difficultés rencontrées au cours de cette recherche, notamment pour identifier des sources spécialisées ou académiques pertinentes dans la masse de ressources disponibles. Dans cette thèse, nous présentons l'utilisation de la plateforme CNKI pour introduire les recherches existantes sur le spatial commercial en Chine. Une sélection de travaux sont ensuite analysés de manière critique, en examinant notamment les affiliations institutionnelles des auteurs, et en proposant une analyse de contenu. Ces axes de recherche visent à répondre directement aux difficultés identifiées par plusieurs auteurs ayant traité du sujet dans la littérature existante.

Liu et al. évoquent des obstacles très concrets du point de vue de chercheurs expérimentés dans le traitement de documents issus de la RPC, notamment l'incomplétude occasionnelle des bases de données en ligne, l'absence de sites web officiels, ou encore la difficulté d'accès et d'interprétation des entretiens de terrain. Ces difficultés ont également été rencontrées dans le cadre de la réalisation de cette thèse[573].

Walsh et al. analysent plus spécifiquement le manque d'accès aux sources locales comme l'une des causes des « fossés » de perception entre les parties prenantes américaines et leur propre évaluation du spatial commercial :

« *Plusieurs raisons expliquent les difficultés d'accès aux sources d'information sur le secteur spatial commercial chinois, la plus importante étant l'absence de compétences linguistiques en mandarin. Les traductions accessibles au public de documents en mandarin sont rares aux États-Unis, ce qui limite l'accès à l'information circulant dans la communauté sinophone à ceux pouvant bénéficier de services de traduction de qualité, ou bien contraints de s'en remettre à des outils automatisés gratuits (comme Google Translate), dont l'exactitude reste limitée. Cela pousse de nombreux acteurs à se reposer sur les perspectives d'un petit nombre d'analystes du secteur spatial capables d'accéder à ces sources. Par ailleurs, les sensibilités géopolitiques et les risques perçus liés aux interactions avec des homologues chinois dans l'industrie spatiale limitent les opportunités de créer des relations interpersonnelles avec des*

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[572] Irina Liu and al., « Evaluation of China's Commercial Space Sector » p.9-11; Pollpeter and al., « China's Space Narrative »p.1-3; Kathryn Walsh, Chris- tensen,andRonci, « Lost Without Translation » p.2-8.Rome, "China's Space Export Strategy." p.2

[573] Irina Liu et al., "Evaluation of China's Commercial Space Sector." p.8

ressortissants chinois susceptibles de répondre à leurs questions ou de leur offrir une perspective locale. »[574]

Ainsi, au-delà de la barrière linguistique, les auteurs identifient un problème de concentration de l'expertise sur le sujet entre les mains d'un petit groupe de « gardiens » (*gatekeepers*), selon les termes de certains de leurs interlocuteurs. De manière originale, le rapport de Walsh et al. souligne également que ces lacunes ne s'expliquent pas uniquement par les sources chinoises, mais aussi par les limites des analyses produites aux États-Unis elles-mêmes :

« *L'industrie spatiale est indissociablement liée aux enjeux de sécurité nationale. Le contexte géopolitique entre la Chine et les États-Unis est donc omniprésent dans les discussions sur la relation spatiale sino-américaine, ainsi que sur le rôle de l'industrie dans ce cadre. Dans la littérature américaine, l'avenir de l'industrie spatiale chinoise est souvent envisagé à travers le prisme de la compétition entre grandes puissances, les ambitions chinoises visant à renforcer ses capacités spatiales étant perçues en fonction de leur impact potentiel sur la sécurité nationale des États-Unis.* »[575]

Cette remarque, qui met en lumière l'existence de récits préconstruits autour du spatial commercial en Chine, s'inscrit dans une ligne critique plus large de la littérature spécialisée portant sur les activités spatiales chinoises, notamment dans les documents de politique publique américains.

[574] Kathryn Walsh, Christensen, and Ronci, "Lost Without Translation." p.11
[575] Kathryn Walsh, Christensen, and Ronci. p.11

Questions épistémologiques liées aux sources anglophones

Un discours de « menace spatiale chinoise » identifié et dénoncé

Une partie de la littérature sur le spatial chinois a de longue date dénoncé la présence de biais épistémologiques dans le traitement des activités spatiales chinoises dans certaines sources anglophones. Selon ces auteurs, les récits dominants sur le sujet, notamment dans les documents de politique publique américains, participent à la construction discursive d'une menace.

Cameron Hunter a consacré une thèse au sujet, dans laquelle il identifie l'émergence et l'influence croissante d'un discours sur la « menace spatiale chinoise » après les années 2000, en particulier à la suite des conclusions de la Commission Rumsfeld[576]. Il analyse l'histoire, le contexte et les implications de ces récits. Selon lui, à cette période, dans les documents de politique publique :

« *Presque toutes les sources américaines évoquant le programme spatial chinois considèrent que son ascension récente constitue une grave menace pour la sécurité nationale des États-Unis.* » [577]

Un des premiers à avoir formulé cette critique est Gregory Kulacki, qui co-signe avec Jeffrey Lewis en 2009 le rapport *A Place for One's Mat*, visant à nuancer la perception des activités spatiales chinoises. Ce rapport s'éloigne d'une lecture strictement militaire et dominante « *Nous avons souvent entendu des Américains affirmer que l'APL "dirige" le programme spatial chinois* » [578], pour souligner la diversité des motivations à l'œuvre. Les auteurs insistent notamment sur la volonté de reconnaissance internationale — une « place à la table », ou plutôt, *une place pour son tapis* [一席之地 *yi xi zhi di*], mise en lumière à travers une analyse historique et des entretiens.

Michael Sheehan parvient à un constat similaire au sujet d'une partie de la littérature anglophone sur les activités spatiales chinoises : « *Pour les partisans de l'interprétation fondée*

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[576] Donald Rumsfeld et al., "Report of the Commission to Assess United States National Security Space Management and Organization," January 11, 2001, https://aerospace.csis.org/wp-content/uploads/2018/09/RumsfeldCommission.pdf.
[577] Cameron Hunter, "The Rise of China in Space Technopolitical Threat Construction in American Public Policy Discourse" (University of Bristol, 2018), https://research-information.bris.ac.uk/ws/portalfiles/portal/183271194/Final_Copy_2018_09_25_Hunter_C_PhD.pdf. p.181.
[578] Gregory Kulacki and Jeffrey Lewis, "A Place for One's Mat: China's Space Program, 1956–2003" (American Academy of Arts and Sciences, 2009). p.29

sur la "menace chinoise", la Chine poursuit activement le développement de capacités militaires spatiales, y compris anti-satellite, afin de mener une guerre asymétrique contre les États-Unis. Il s'agirait d'une stratégie logique et prévisible, dans la mesure où la Chine a correctement identifié les infrastructures spatiales américaines comme le "talon d'Achille" de leur puissance militaire. »[579]

Dans son analyse de l'évolution du rôle de l'armée et des organes de sécurité dans la gouvernance spatiale chinoise, Sheehan souligne également l'importance du prestige pour le public chinois, aux côtés d'objectifs politiques et de développement, ainsi que le poids de l'histoire nationale, notamment celle du « siècle des humiliations ». Il résume ainsi : « *Considérer la politique chinoise uniquement à travers le prisme des relations sino-américaines, et accorder une importance disproportionnée à la dimension militaire, conduit à une interprétation étroite et trompeuse des facteurs qui structurent le programme spatial chinois.* »[580]

Lincoln Hines a étudié l'importance de l'opinion publique comme moteur de l'exploration spatiale chinoise, notamment dans les programmes scientifiques et habités, à travers un sondage en ligne regroupant plus de 1 400 répondants basés en RPC. Il note lui aussi : « *Pour expliquer la montée en puissance spatiale de la Chine, les analystes se concentrent souvent sur le rôle de la doctrine militaire chinoise.* »[581]

Il est important de noter que ni Kulacki et Lewis, ni Sheehan ne cherchent à nier l'existence de motivations militaires, ou plus largement de sécurité et de défense, dans le développement du programme spatial chinois. Leur objectif est plutôt de souligner que ces considérations ne devraient pas être les seules prises en compte dans l'analyse, et qu'il existe d'autres logiques explicatives.

Dans le cadre de cette recherche, il ne s'agit pas non plus de rejeter les travaux analysant les logiques militaires et de défense à l'œuvre dans le spatial commercial chinois, mais de rappeler la diversité des objectifs poursuivis, dont certains sont encore peu explorés, en raison d'un biais persistant dans la littérature, centrée sur les capacités militaires chinoises et leur potentiel menaçant pour les États-Unis. Par exemple, Nie propose une lecture critique de la stratégie

[579] Sheehan, "'Did You See That, Grandpa Mao?" p.109
[580] Sheehan, "'Did You See That, Grandpa Mao?" p.107
[581] Hines, "Heavenly Mandate."

d'intégration militaro civile [军转民 *junzhuanmin*], sans pour autant s'inscrire dans un discours alarmiste sur une menace spatiale chinoise. [582]

Yongjing Zhang évoque quant à lui le rôle d'un « regard stratégique » (*strategic gaze*) porté par certains intellectuels américains, qui prolonge dans l'espace une vision géopolitique de la rivalité entre grandes puissances. Il estime que ce regard a « *produit un imaginaire de la Chine comme autre menaçant, déterminé à poursuivre une stratégie militaire spatiale dans une logique de suprématie face aux États-Unis* ». [583]

Suzuki avance une explication historique à la prépondérance des analyses militaires dans l'étude du spatial chinois : « *Étant donné que l'industrie aérospatiale, incluant le segment spatial, a longtemps été un pilier de l'industrie de défense en Europe, et que les technologies spatiales aux États-Unis et en Union soviétique ont été développées dans une logique militaire, il est facile de présumer que le secteur spatial s'est partout construit autour d'une logique de sécurité (y compris de sécurité intérieure).* » [584]

Un discours également présent dans les analyses du spatial commercial en Chine

Certains éléments rhétoriques présents dans le rapport du CASI intitulé *China Private Aerospace Companies* reprennent les types de discours critiqués par les auteurs mentionnés précédemment. Ce rapport propose une évaluation des risques associés à une série d'entreprises spatiales commerciales établies en RPC, en mettant l'accent sur leurs liens potentiels avec l'APL. Les méthodologies utilisées pour établir l'existence de ces « liens avec l'APL » sont sujettes à caution, incluant notamment la mention de la stratégie d'intégration civilo-militaire sur les sites web officiels des entreprises étudiées, ou encore leur participation à des concours d'innovation à vocation militaire.

« *Le Secrétaire général Xi Jinping et d'autres hauts responsables du Parti communiste chinois mettent en œuvre des politiques visant à faire de la Chine une superpuissance en science et technologie, ainsi qu'à bâtir une armée capable de mener et de gagner des guerres de haute*

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[582] M. Nie, « Space Privatization in China's National Strategy of Military-Civilian Integration: An Appraisal of Critical Legal Challenges », Space Policy 52 (1 May 2020): 101372, https://doi.org/10.1016/j.spacepol.2020.101372.
[583] Yongjin Zhang, "The Eagle Eyes the Dragon in Space: A Critique," *Space Policy* 29, no. 2 (April 26, 2013): 113–20, https://doi.org/10.1016/j.spacepol.2013.03.002. p.120
[584] Kazuto Suzuki, "Space Policies of Japan, China and India: Comparative Policy Logic Analysis," 2019, https://www.semanticscholar.org/paper/Space-Policies-of-Japan%2C-China-and-India%3A-Policy-Suzuki-Kazuto/35e5d868d2b44da3762fc8271ab98a6d5f28b406.p.52

technologie. […] Des initiatives sont en cours pour rendre les grandes entreprises publiques de défense plus efficaces, compétitives à l'échelle mondiale, et innovantes, en s'inspirant du secteur commercial et de ses produits à usage dual. Cette initiative se manifeste à travers la campagne nationale de "fusion civilo-militaire" lancée en 2012. […] »[585]

Le second rapport du CASI, *China's Space Narrative*, présente des schémas rhétoriques similaires, en posant la stratégie de fusion civilo-militaire comme principale justification de l'émergence du spatial commercial en Chine, à travers un langage qui peut être perçu comme alarmiste, voire conflictuel : « *Dans le cadre de la politique chinoise de fusion civilo-militaire, qui vise à exploiter les synergies entre les applications technologiques militaires et civiles, le programme spatial chinois s'oriente de plus en plus vers la génération de retombées commerciales et économiques. Il semble désormais fonder une justification à long terme de l'exploration spatiale qui va au-delà de la sécurité nationale ou de la recherche scientifique, pour concevoir l'espace comme la prochaine frontière de l'expansion économique.* »[586]

Un aspect qui n'est pas directement abordé dans la littérature critique sur les analyses du spatial chinois concerne la manière dont l'*altérisation* présente dans ces récits tend à construire l'image d'un tout unifié, cohérent et rationnel. Ce phénomène est particulièrement perceptible dans l'extrait second rapport du CASI ci-dessus où l'usage répété du terme « Chine » suggère qu'une seule entité coordonnée serait simultanément responsable de la politique de fusion civilo-militaire et de l'ensemble du programme spatial chinois. Ce raccourci rhétorique tend à englober un vaste ensemble d'activités, portées par des acteurs très divers dans leur formulation comme dans leur mise en œuvre, sous une entité monolithique : « la Chine » ou le « Parti communiste chinois ».

Cette rhétorique m'a rappelé, au début de mes recherches sur le spatial commercial, une précédente expérience de terrain consacrée aux relations sino-africaines, et plus précisément aux liens bilatéraux entre la RPC et l'Angola. Dans ce champ, certains chercheurs, notamment ceux affiliés au *China Africa Research Initiative* de l'université Johns Hopkins, alors sous la direction de Deborah Brautigam, plaidaient pour une analyse rigoureuse des données quantitatives, en particulier sur les prêts accordés à travers le continent, et pour des recherches

[585] Hull, Markov, and Griffin, "'Private' Chinese Aerospace Defense Companies," June 2020. p.4
[586] Pollpeter et al., "China's Space Narrative - Examining the Portrayal of the Us-China Space Relationship in Chinese Sources and Its Implications for the United States." Chapter 4: Making China Rich: China's View On Commercial Space and Space Natural Resource Extraction p.29

de terrain capables de nuancer le récit dominant d'une Chine présentée comme « donateur voyou » (*rogue donor*) ou acteur néocolonial en Afrique[587].

Dans le cas spécifique de l'Angola, les travaux de Lucie Corkin ont mis en évidence le rôle actif des élites angolaises dans la négociation des accords de prêt avec la Chine[588]. Ses conclusions, tout comme les miennes, ont souligné la fragmentation des acteurs chinois impliqués dans les relations bilatérales : du ministère des Affaires étrangères aux entreprises publiques, en passant par les travailleurs migrants qu'elles emploient, ou encore des intermédiaires aux pratiques mafieuses chargés de faciliter les échanges entre autorités chinoises et angolaises. Ces acteurs poursuivaient souvent des objectifs divergents, voire contradictoires, contrastant fortement avec la représentation dominante d'un État chinois omnipotent et homogène[589].

En mobilisant le point de vue des auteurs critiques mentionnés dans la section précédente, une telle simplification pourrait être vue comme nécessaire à la construction du discours d'une « menace spatiale chinoise ». Celle-ci repose en effet sur l'idée d'un effort de planification coordonné, impliquant l'ensemble des parties prenantes des activités spatiale chinoises, œuvrant de concert dans un projet unifié qui menacerait les intérêts américains.

Un tel cadrage de « menace spatial chinoise » empêche pourtant d'identifier la pluralité d'acteurs engagés dans les activités du spatial commercial en Chine — qu'il s'agisse d'organes étatiques, d'acteurs industriels, d'investisseurs ou d'entrepreneurs. Plus encore, il occulte les divergences d'intérêts potentielles, les défauts de coordination, voire les tensions existantes entre ces acteurs. C'est précisément l'un des résultats centraux de cette recherche doctorale : mettre au jour la pluralité des acteurs impliqués — parfois porteurs d'agendas divergents — et la complexité du puzzle institutionnel et économique dissimulée derrière ce qui est trop souvent présenté comme une stratégie chinoise unifiée.

Bien que Walsh et al. ne fassent pas explicitement le lien entre une vision « homogènéisante » du spatial en Chine et le concept d'*altérisation*, ils en soulignent néanmoins les effets négatifs sur la compréhension qu'ont les parties prenantes américaines du spatial commercial chinois :

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[587] Voir par exemple Deborah Brautigam, *The Dragon's Gift: The Real Story of China in Africa*, Oxford University press, 2009.
[588] Lucie Corkin, *Uncovering the African Agency - Angola's Management of China's Credit Lines*, Taylor&Francis (University of London, 2013).
[589] Joan Johnson-Freese, *The Chinese Space Program: A Mystery Within a Maze*, First Edition (Malabar, FL: Krieger Pub Co, 1998).

« *La Chine est perçue comme développant des activités commerciales dans l'espace, mais les parties prenantes américaines la considèrent généralement comme un tout monolithique, le gouvernement chinois et ses extensions étant perçus comme les seuls moteurs du spatial commercial chinois. Il en résulte un certain scepticisme à l'idée qu'il puisse exister des entités privées ou semi-privées motivées uniquement par des logiques capitalistes.* »[590]

Michael Sheehan établit un lien entre la difficulté d'accès à des sources fiables et la prévalence des analyses néo-réalistes du secteur spatial commercial chinois, qui l'inscrivent dans un récit de rivalité entre grandes puissances. « *Au cours des vingt dernières années du XXe siècle, il était difficile d'analyser les facteurs influençant le développement spatial chinois, car ce dernier ne semblait suivre ni trajectoire ni rythme cohérent. […] Ce schéma a nourri un récit occidental dans lequel le programme spatial chinois aurait connu une accélération significative motivée par une volonté croissante d'acquérir des capacités de grande puissance, notamment militaires, inspirées des démonstrations américaines lors de la guerre du Golfe de 1991. Il s'agit là d'une lecture néo-réaliste de la position de la Chine dans l'ordre international contemporain.* »[591]

En écho aux observations faites par les auteurs cités plus haut, il convient de souligner que dans les rapports du CASI mentionnés au début de cette section, seule la politique de fusion civilo-militaire (CMI) est mobilisée comme cadre de référence pour analyser l'émergence du spatial commercial en Chine. Aucune démonstration approfondie n'est cependant proposée quant à la manière dont cette stratégie s'articule concrètement avec les activités commerciales spatiales chinoises.

Compte tenu de l'opacité du secteur spatial institutionnel chinois, telle que présentée précédemment, on peut comprendre que les rapports du CASI se limitent à établir un parallèle raisonnable entre CMI et spatial commercial, et proposent des hypothèses fondées sur des éléments indirects.

Ce qui surprend davantage, en revanche, c'est que les liens potentiels avec d'autres politiques plus larges, sans lien direct avec la sphère militaire, ne soient pas envisagés dans des termes similaires. Aucune connexion n'est faite, par exemple, avec les politiques de *croissance de*

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[590] Walsh, Christensen, and Ronci, "Lost Without Translation - Identifying Gaps in U.S. Perceptions of the Chinese Commercial Space Sector." p.22

[591] Michael Sheehan, "'Did You See That, Grandpa Mao?' The Prestige and Propaganda Rationales of the Chinese Space Program," *Space Policy*, Special Issue: China's Rising Star, Japan's Re-entry: East Asia's Space Security in a Global Context, 29, no. 2 (May 1, 2013): 107–12, https://doi.org/10.1016/j.spacepol.2013.03.003. p.107

qualité [高质量发展 *gao zhiliang fazhan*], de la *Stratégie de développement fondée sur l'innovation* [创新驱动发展战略 *chuangxin qudong fazhan zhanlüe*], ou *Made in China 2025*, qui visent notamment à moderniser les capacités industrielles chinoises. Ces politiques, bien que fréquemment évoquées dans les médias anglophones généraux (hors spatial) et présentées comme prioritaires par les autorités chinoises, offrent pourtant des pistes d'analyse tout aussi légitimes pour comprendre l'essor du spatial commercial.

Cette thèse examine l'émergence du secteur spatial commercial chinois à travers une combinaison de données qualitatives et quantitatives, en se concentrant notamment sur le cas des entreprises de lancement commercial. Plutôt que de considérer comme acquises les catégories de « privé » ou de « commercial », elle interroge leurs significations juridiques, économiques et politiques dans le contexte chinois. Elle examine l'évolution du discours public, les cadres réglementaires et les dynamiques d'investissement, tout en analysant la manière dont différents types d'acteurs — publics, hybrides ou *minying* — se positionnent par rapport aux politiques étatiques et aux dynamiques de marché. L'objectif n'est pas seulement d'apporter un éclairage empirique précis, mais aussi de questionner de manière critique la construction, l'usage et la remise en cause des récits de commercialisation dans la Chine contemporaine.

Une fois exposées les motivations et les choix méthodologiques qui ont guidé cette thèse — en particulier le recours aux sources en mandarin —, ce travail débute par l'exploration du paysage discursif spécialisé en langue chinoise sur le spatial commercial.

Partie 1

Chapitre I - Cartographie de la littérature en chinois sur le spatial commercial

Ce premier chapitre établit les fondements méthodologiques de la Partie 1 de la thèse en présentant une revue de la littérature spécialisée en langue chinoise sur le spatial commercial, réalisée via la plateforme China National Knowledge Infrastructure (CNKI). Il s'agit d'une démarche originale dans la mesure où, à notre connaissance, aucune revue systématique de la littérature académique et spécialisée sur le spatial commercial en Chine n'a été menée auparavant, ni en anglais ni en mandarin.

Le chapitre débute par une présentation des modalités de recherche documentaire sur CNKI. Les mots-clés retenus « spatial commercial Chine » 中国商业航天 [*zhongguo shangye hangtian*]— ont été sélectionnés afin de circonscrire le corpus aux publications spécifiquement centrées sur le cas chinois. L'usage de la plateforme s'appuie sur l'interface de recherche académique et repose sur un accès institutionnel via la BULAC. Le chapitre insiste sur l'importance d'expliciter les méthodes de recherche sur des plateformes chinoises comme CNKI ou Aiqicha. Cette démarche vise à encourager l'adoption de bonnes pratiques méthodologiques, y compris par des chercheurs non sinophones.

Sur le plan méthodologique, l'utilisation de CNKI est justifiée par sa fiabilité, son accessibilité depuis l'étranger et la richesse de son catalogue. Néanmoins, plusieurs limites sont identifiées: volatilité des résultats, absence de certains textes en libre accès, biais potentiels de publication et incertitudes quant à la représentativité des lecteurs effectifs. De plus, des interruptions d'accès à la base depuis l'étranger, comme entre avril 2023 et avril 2024, soulignent la fragilité de l'accès aux sources pour les chercheurs étrangers et les défis liés à la collecte d'informations de sources chinoises face à de nouvelles restrictions règlementaires.

Si CNKI constitue un outil précieux, il ne saurait couvrir l'ensemble du spectre des discours existants sur le spatial commercial en Chine. Certaines opinions, notamment celles des acteurs privés, institutionnels ou entrepreneurs du secteur, peuvent ne pas trouver d'expression dans les revues académiques accessibles au public. Le discours publié peut être limité par ce qui relève d'un « politiquement correct », d'autant plus qu'il s'agit d'un domaine « sensible » [敏感 *mingan*] faisant l'objet d'une promotion par les pouvoirs centraux. Pour pallier ces biais, la recherche de thèse combine l'analyse documentaire à d'autres approches.

Une première analyse macro du corpus (384 résultats au moment de la recherche) fait apparaître une augmentation significative du nombre de publications entre 2015 et 2018, culminant en 2018-2019, avant une baisse progressive jusqu'en 2022. Cette évolution reflète une montée en visibilité du concept de « spatial commercial » en Chine au cours de cette période, peut-être en lien avec l'adoption de nouvelles politiques de soutien à l'innovation technologique.

L'analyse des publications met en évidence une concentration importante des résultats au sein de quelques revues, dont la majorité sont affiliées à des entités du groupe étatique CASC (China Aerospace Science and Technology Corporation). Cinq des sept revues les plus prolifiques sont parrainées par des instituts ou entreprises du groupe CASC, et plus de 36 % des articles du corpus proviennent de deux instituts de la CASC : *China Aerospace Academy of Systems Science and Engineering* et *Beijing Institute of Space Science and Information*. Ce constat suggère une *domination discursive* de CASC dans la production éditoriale spécialisée sur le spatial commercial. Si ce biais ne remet pas en cause la validité des contenus publiés, il impose de considérer la manière dont certains contenus éditoriaux, notamment les définitions, pourraient être structurés par les intérêts de cet acteur majeur du secteur.

Le profil des auteurs renforce cette hypothèse tout en la nuançant. Parmi les dix auteurs les plus prolifiques identifiés, seuls deux sont affiliés directement à des unités de CASC. Les autres sont issus de milieux variés : journalistes, juristes spécialisés en droit international, consultants ou chercheurs indépendants.

En somme, ce chapitre joue un rôle double : il fournit une base méthodologique claire pour la suite de la thèse tout en cartographiant les dynamiques éditoriales et institutionnelles qui façonnent le discours chinois sur le spatial commercial. Il démontre à la fois les opportunités offertes par les sources académiques chinoises et les précautions à prendre pour en analyser les biais et les lacunes.

Chapitre II – Analyse du discours spécialisé : étude d'un corpus d'articles

Ce chapitre propose une analyse de contenu d'un échantillon de 30 articles issus de la base de données CNKI, sélectionnés à l'aide des termes de recherche « spatial commercial Chine ». L'objectif est d'affiner et d'enrichir les constats du chapitre précédent concernant les productions en mandarin relatives au spatial commercial, en s'intéressant plus particulièrement à la diversité des définitions et des typologies d'entreprises.

La première partie du chapitre expose la méthode de sélection des articles, fondée sur une combinaison de critères de pertinence, de popularité par nombre de téléchargements et de citation. La lecture manuelle des textes en version originale a été privilégiée afin de préserver les nuances sémantiques dont les traductions automatiques ne rendent pas pleinement compte, et d'acquérir le vocabulaire nécessaire à la conduite d'entretien de terrain en langue source.

L'échantillon d'articles peut être classé selon une typologie en sept catégories : articles d'opinion, articles de recherche, études juridiques, rapports de FutureSpace Research Institute (entreprise de conseil et d'investissement spécialisée faisant figure d'autorité en RPC), presse spécialisée, documents promotionnels du groupe CASC, et comptes-rendus de forums. Près de la moitié des textes sont des articles d'opinion, souvent brefs, non référencés, et marqués par un ton accessible. Leur contenu est significatif en raison de leur capacité à refléter des perceptions dominantes ou émergentes, mais leur cartographie difficile à défaut de citations suffisantes des auteurs entre eux. Pour comprendre le positionnement des auteurs, il revient donc de lire les textes, et souvent de dépasser un vernis « politiquement correct » pour en comprendre le sens implicite.

Une première lecture du corpus donne l'impression d'un consensus général : le spatial commercial est présenté comme une tendance positive, inévitable, voire nécessaire. 13 articles qualifient le sujet de « thème en vogue » (*hot topic*), certains insistent sur ses perspectives économiques prometteuses, et plusieurs le lient directement à des stratégies nationales. L'argumentation repose parfois sur une mise en récit historique du passage du monopole étatique à une logique de marché, ou sur des considérations biologisantes sur l'évolution naturelle des industries. Ce consensus apparent mérite néanmoins d'être interrogé.

Une lecture approfondie révèle en effet une pluralité de définitions du concept, souvent implicites. Deux auteurs, Liu Yufei et Shen Nian, s'en distinguent en pointant explicitement l'ambiguïté de la définition du « spatial commercial » et en identifiant des stratégies d'instrumentalisation de cette ambiguïté par différents types d'acteurs. Shen, critique vis-à-vis des entreprises privées, considère que le terme est utilisé à la fois par des entreprises d'État cherchant à capter des parts de marché, et par des acteurs privés visant l'obtention de ressources publiques. Liu, quant à elle, distingue clairement deux phénomènes : la *commercialisation du spatial* comme adaptation d'infrastructures étatiques à des logiques de marché remontant aux années 1980, et le *spatial commercial* comme création d'acteurs selon un modèle de marché plus récente. Elle critique le manque d'authenticité de l'utilisation de ce dernier label par

certaines entités issues des réformes du secteur étatique, potentiellement les spin off traités dans la thèse sur le secteur des lanceurs, ExPace et China Long March Rocket (CLMR).

D'autres auteurs proposent des cadres conceptuels similaires, sans toujours reprendre la terminologie de Liu. Jiang Shengli, par exemple, distingue une acception large du terme, impliquant les entreprises d'État, et une acception restreinte, réservée aux entreprises privées, tout en plaidant pour une coexistence harmonieuse des deux. Zhao Jiayi, Zhou Guanghui et Wei Qi'ao adoptent un raisonnement analogue, évoquant une transition historique du modèle étatique vers un modèle hybride puis privé. L'analyse met également en évidence que ces positions peuvent être liées aux affiliations institutionnelles des auteurs universités, laboratoires de recherche, entreprises d'État ou médias spécialisés, mais qu'il n'y a pas de rejet systématique des entreprises privées par les auteurs affiliés à des laboratoires de la CASC.

Certains textes proposent enfin des typologies d'entreprises basées sur d'autres critères : modèle économique, origine des financements, intégration verticale, ou liens avec des institutions de recherches comme la CAS. Les rapports de FutureSpace adoptent une approche quantitative, fondée sur des indicateurs comme la capacité d'innovation ou la performance économique. Quelques auteurs, notamment issus de la presse spécialisée, optent pour des classifications sectorielles (lanceurs, satellites, services associés).

En définitive, ce chapitre montre que sous un apparent consensus positif, les discours spécialisés sur le spatial commercial en Chine sont traversés d'enjeux de légitimation, d'ambiguïtés, voire de tensions. Il révèle aussi la complexité du paysage éditorial chinois sur la question, et les limites d'une lecture univoque. Le chapitre prépare ainsi le terrain pour une exploration plus approfondie des dimensions réglementaires (Chapitre III) et politiques (Chapitre IV) du secteur.

Partie 2

Chapitre III – Étude d'un corpus de textes de politiques relatives au spatial commercial

Ce troisième chapitre propose une analyse du cadre réglementaire et politique applicable aux activités spatiales commerciales en Chine, à partir d'un échantillon de textes compilés par le *FutureSpace Research Institute* (ci-après aussi FutureSpace) dans son rapport *Commercial Space Development Report 2022*. Cette sélection constitue un effort de synthèse sur les politiques publiques concernant le spatial commercial, dans un contexte marqué par la fragmentation institutionnelle et l'absence de corpus juridique unifié. Le chapitre s'inscrit dans la continuité des réflexions précédentes sur la nature incertaine et plurielle du spatial commercial en Chine, et pose les bases pour l'étude de cas sur les lanceurs commerciaux développée dans la partie suivante de la thèse.

L'analyse du corpus de textes politiques et règlementaires réunis par FutureSpace met en évidence la pluralité des organes émetteurs : Conseil des affaires d'État, Commission militaire centrale, Commission nationale pour le développement et la réforme (NDRC), ministère de l'Industrie et des Technologies de l'information (MIIT), ministère des Finances (MOF), et l'Administration d'État pour la science, la technologie et l'industrie de la défense nationale (SASTIND). Ce morcellement institutionnel reflète la nature intersectorielle des politiques spatiales, au carrefour de logiques économiques, technologiques et stratégiques. Il illustre également la difficulté de coordination identifiée par plusieurs auteurs chinois dans la Partie 1, évoquant notamment l'image des « neuf dragons contrôlant la rivière » [九龙治水 *jiu long zhi shui*].

La diversité des textes recensés se manifeste aussi bien dans leur nature (avis, opinions, plans, notices, mesures provisoires, livres blancs) que dans leur portée : certains ont une visée programmatique large (par exemple *Made in China 2025*, plan quinquennal), d'autres traitent de domaines très ciblés (par exemple partage des données de télédétection, ou la fiscalité liée à l'aérospatial). Cette hétérogénéité complique la lecture d'ensemble et confirme les critiques déjà formulées par les auteurs chinois spécialisés dans le Chapitre II sur l'absence de structure légale spécialisée dans le domaine spatial chinois.

L'analyse chronologique du corpus met en lumière une dynamique d'ouverture progressive du secteur spatial aux capitaux non-étatiques. Dès 2007, un premier texte encourage l'entrée du

capital social dans les applications satellitaires. En 2012, les *Opinions sur l'encouragement du capital populaire dans l'industrie de la défense* amorcent l'intégration des acteurs privés dans la recherche et production duales, civile et militaire. Le tournant de 2014 est fréquemment cité comme point de départ du spatial commercial, bien que cette datation repose davantage sur une reconnaissance implicite d'une ouverture du segment amont (fabrication, lancement) que sur une rupture juridique nette.

Le chapitre insiste sur le caractère ambigu des textes analysés, en particulier sur l'absence de définition claire de notions-clés comme « spatial commercial », « infrastructure spatiale civile nationale », « capital social » ou « capital populaire ». Cette imprécision lexicale pourrait permettre une certaine plasticité interprétative, offrant une relative marge de manœuvre dans la mise en œuvre des politiques, par les gouvernements locaux notamment. On peut formuler l'hypothèse que ce flou normatif, bien que dénoncé par les auteurs du Chapitre II comme n'offrant pas une prévisibilité suffisante aux entreprises privées, joue aussi un rôle exploratoire au plan politique, permettant d'expérimenter sans figer les orientations dans un cadre juridique rigide, ce qui est cohérent avec la portée non contraignante de ces textes — davantage assimilables à des lignes directrices qu'à des lois formelles.

L'étude des textes permet également d'observer une évolution de la place occupée par le secteur des lanceurs commerciaux. Bien que non mentionné dans les textes fondateurs, celui-ci est évoqué dès 2014, avant que des mesures spécifiques ne soient prises en 2019. Cette évolution suggère que les textes de politique générale fonctionnent comme des signaux d'orientation, auxquels viennent s'ajouter ultérieurement des régulations plus spécifiques. Cette dynamique est particulièrement visible à l'échelle provinciale, où plusieurs politiques publiques sectorielles ont vu le jour.

Enfin, le chapitre souligne que l'intégration du spatial commercial dans des documents de politique publique plus larges, tels que *Made in China 2025*, témoigne de sa reconnaissance en tant que secteur stratégique au service du développement industriel, de l'innovation et de la montée en gamme technologique. Les composantes militaires, économiques et scientifiques du spatial commercial coexistent sans articulation claire, renforçant l'impression de flou structurel.

En résumé, ce chapitre illustre la construction progressive d'un cadre politique pour le spatial commercial en Chine, à travers un corpus de textes épars, issus de multiples organes, dont la portée et la fonction varient. Cette politique publique fragmentée mais évolutive s'inscrit dans

une logique d'expérimentation encadrée, fondée sur des textes indicatifs plutôt que prescriptifs, permettant une appropriation flexible par une pluralité d'acteurs.

Chapitre IV – Analyse d'un corpus de textes relatifs aux lancements spatiaux commerciaux

Ce chapitre propose une étude approfondie de l'évolution du cadre politique et réglementaire pertinent au développement des activités de lancement spatial commercial en Chine. Il s'appuie, dans un premier temps, sur l'analyse diachronique des Livres blancs sur les activités spatiales chinoises (2000–2022), avant de se concentrer sur trois textes clés : les *Mesures d'intérim sur les projets civils de lancement spatial* (2002), les *Opinions directives sur les mécanismes d'investissement et de financement dans les domaines prioritaires* (2014), et les *Opinions pour le développement ordonné des lanceurs commerciaux* (2019).

L'analyse des *Livres blancs* montre une évolution significative du discours officiel sur l'espace commercial. Alors que le *Livre blanc* de 2000 met l'accent sur la commercialisation internationale des services de lancement via les lanceurs Longue Marche, les éditions ultérieures réduisent progressivement la place accordée à ces activités. Dès 2006, l'usage du terme « commercial » s'étend aux applications spatiales nationales, notamment les télécommunications, la navigation et l'observation de la Terre. Cette tendance culmine dans le Livre blanc de 2022, où les lanceurs commerciaux, y compris ceux développés par des entreprises privées, sont explicitement mentionnés. Le texte consacre également pour la première fois une section dédiée à l'espace commercial, bien que les termes employés (« commercialisation », « commercial ») ne soient pas définis, ce qui prolonge les observations formulées dans le chapitre précédent sur l'élasticité terminologique.

Le Livre blanc de 2022 introduit également la notion d'« infrastructures de lancement commercial » et prévoit des dispositifs incitatifs tels que l'ouverture des marchés publics aux entreprises commerciales, la création de plates-formes de test et la participation aux grands projets. Cependant, il ne précise pas la nature des entités concernées (privées, mixtes, dérivées de SOEs), ni les critères d'accès à ces dispositifs.

Le chapitre se penche ensuite sur trois textes réglementaires emblématiques, qui, ensemble, illustrent l'évolution du cadre légal et politique autour des activités de lancement commercial.

Le premier, les *Mesures d'Intérim de 2002*, établit un système d'autorisation pour les projets de lancement civil, géré par la COSTIND. Le texte, bien que succinct, introduit un régime de

déclaration, une responsabilité juridique, ainsi qu'une définition du périmètre des activités civiles de lancement. Ces mesures s'inscrivent dans un contexte d'ouverture progressive vers l'international et d'ajustement aux standards requis pour l'adhésion à l'OMC. Elles visent avant tout à encadrer la commercialisation des lanceurs étatiques existants à destination de clients étrangers, et non l'émergence d'acteurs privés, encore absente à l'époque.

Le deuxième texte, *les Opinions directrices* de 2014, souvent présentés comme un tournant fondateur pour le spatial commercial chinois, ont une portée bien plus large que ce seul secteur. Il s'agit d'un texte traitant de la restructuration économique de secteurs historiquement dominés par l'État, incluant l'infrastructure spatiale civile nationale. Le spatial y figure parmi huit secteurs dits « prioritaires » : écologie et environnement ; ingénierie agricole et hydraulique ; infrastructures municipales ; transports ; installations énergétiques ; infrastructures de l'information et du spatial civil ; et initiatives sociales. Le texte promeut l'entrée du « capital social » dans ces domaines par des mécanismes variés : subventions, partenariats public-privé, marchés publics, réformes juridiques sectorielles, et projets pilotes. Les lanceurs ne sont pas explicitement mentionnés, mais l'encouragement à la diversification des investisseurs et opérateurs, ainsi que l'introduction de nouvelles formes de financement, créent un environnement favorable à l'émergence d'entreprises spatiales privées.

Enfin, les *Opinions de 2019*, publié par la SASTIND et la Commission militaire centrale, établit un cadre réglementaire détaillé pour les lanceurs commerciaux. Il en propose une définition claire, fondée sur la nature du capital et l'objectif lucratif, et encadre l'ensemble de la chaîne d'activités (R&D, production, test, lancement). Deux régimes d'autorisation sont distingués : un pour les activités liées à l'armement, l'autre pour les lancements. Le texte clarifie également les responsabilités entre autorités nationales et provinciales, et mentionne explicitement les réglementations connexes (explosifs, contrôle des exportations, sécurité industrielle). Le recours à l'expression « développement ordonné » dans le titre peut être interprété comme une réponse critique à une phase antérieure jugée trop désorganisée.

En résumé, ce chapitre retrace le passage d'un encadrement minimal et centré sur les clients étrangers à un dispositif plus complexe, visant à intégrer, structurer et encadrer l'émergence d'acteurs privés et mixtes dans le domaine du lancement spatial. Loin d'un plan directeur centralisé, ce processus apparaît comme une série d'ajustements rétrospectifs et de politiques exploratoires, révélant une co-évolution entre régulations et dynamiques sectorielles.

Partie 3

Chapitre V – Évaluation du marché chinois des lancements commerciaux selon le type d'entreprise

Ce chapitre dresse un état des lieux du marché chinois des lancements commerciaux à la date de mai 2024, à partir d'une sélection de treize entreprises considérées comme représentatives du secteur. L'analyse combine des données sur l'offre, la demande et les modèles de fonctionnement des entreprises selon leur type — privé, à propriété mixte liée à l'Académie des sciences, ou dérivées d'entreprises d'état (SOE).

La première section introduit les enjeux du marché et les caractéristiques générales des entreprises retenues, en s'appuyant sur des données publiquement accessibles. Un tableau synthétique présente les lanceurs développés par ces entreprises, soulignant une forte concentration de l'offre sur les lanceurs légers à propulsion solide. Quelques entreprises se distinguent cependant : OrienSpace avec un lanceur solide à capacité plus élevée, Space Pioneer et Landspace avec des lanceurs à propulsion liquide opérationnels.

Du côté de l'offre, ce chapitre pose des constats importants sur les dynamiques d'entrée sur le marché. Il montre que les entreprises privées ont été les premières à se positionner sur le secteur des lanceurs, avant d'être progressivement rejointes par les spin-offs des SOE à partir de 2016. Un modèle de développement, avec un premier lanceur à propulsion solide suivi du développement d'un modèle liquide plus performant, semble avoir constitué une trajectoire commune à de nombreuses entreprises privées et à CAS Space. Les filiales des SOE (ExPace, China Long March Rocket) n'ont pas indiqué de tels plans de développement, indiquant un modèle économique distinct, axé davantage sur la commercialisation de technologies existantes que sur le développement de nouvelles.

Les lanceurs à propulsion solide sont ainsi considérés par certaines entreprises privées et CAS Space comme une étape d'entrée dans le secteur, plus accessibles technologiquement et financièrement, mais offrant moins de flexibilité que la propulsion liquide. L'évolution vers des lanceurs à propulsion liquide s'accompagne d'objectifs techniques plus ambitieux, notamment pour répondre à la demande croissante liée aux constellations de satellites. L'usage du couple LOX-méthane par certaines entreprises est interprété comme un choix technologique stratégique et symbolique, bien que coûteux.

L’analyse de la demande repose sur les charges utiles lancées par ces entreprises. Trois catégories principales de satellites émergent : l’observation de la Terre (plus de la moitié des cas), la démonstration technologique et scientifique (environ un tiers), et les télécommunications, notamment les constellations IoT (près de 20 %). Les principaux clients incluent CGSTL, Minospace, Xiyong et Guodian Gaoke. Il n’a pas été observé de lien systématique entre le type de client et le profil de l’entreprise fournissant les services de lancement, ce qui suggère que les choix ne sont pas principalement motivés par des affinités institutionnelles mais peut être plutôt des critères techniques ou économiques.

Le chapitre met finalement en lumière deux dimensions clés de la demande : l’accès aux marchés publics et la capacité à opérer à l’international. Concernant les contrats publics, malgré une ouverture affichée des autorités à l’investissement privé, les entreprises privées restent largement exclues des programmes institutionnels, toujours dominés par les SOE. En matière de marché international, les ambitions affichées par certaines entreprises se heurtent à des obstacles majeurs, notamment les restrictions à l’exportation, les considérations diplomatiques et la prépondérance des SOE dans les projets de coopération spatiale extérieure.

Le chapitre insiste sur les enjeux de fiabilité, de certification et d’accès aux infrastructures, qui conditionnent la viabilité économique de ces entreprises et leur reconnaissance institutionnelle. Le succès dans les premières phases de développement repose moins sur les revenus générés par les lancements que sur la capacité à attirer de nouveaux financements, via des démonstrations techniques et une communication efficace. Ce facteur contribue à différencier les entreprises minying et mixtes des filiales des SOE, plus discrètes.

Chapitre VI – Diversité des structures d'actionnariat et implantation territoriale : données financières sur les entreprises commerciales de lancement

Ce chapitre s'appuie sur des données financières accessibles publiquement pour analyser les structures d'actionnariat et la répartition géographique des filiales de treize entreprises chinoises spécialisées dans les lancements spatiaux commerciaux. En cohérence avec la typologie établie précédemment, ces entreprises sont regroupées en trois catégories : les entreprises privées, les spin-offs de SOE, et les structures à capital mixte issues de la CAS.

L'analyse confirme que cette typologie se reflète dans les structures concrètes de l'actionnariat des entreprises commerciales, les profils d'investisseurs et les stratégies d'implantation territoriale. Les entreprises privées présentent des niveaux de capital souscrit très variables, allant de 1 million à plus de 370 millions de RMB, avec une moyenne autour de 73 millions. Dans ces entreprises, les fondateurs et cadres jouent un rôle majeur dans la formation du capital initial, représentant plus de la moitié des parts en 2020, et conservant une position prépondérante en 2023 malgré l'entrée de nouveaux investisseurs.

Les entreprises privées étudiées comptent un nombre significatif d'investisseurs indirects via des véhicules financiers contrôlés par les fondateurs. Ces formes d'investissement indirect sont caractéristiques de sociétés telles que Space Trek, Galactic Energy, ou encore iSpace. Par ailleurs, certaines entreprises reçoivent des financements ciblés de fonds d'investissement locaux, comme c'est le cas pour Deep Blue Aerospace ou OneSpace, illustrant une forme de soutien économique de l'état à l'échelle provinciale ou municipale, sans commune mesure avec ce qui est évoqué dans certains textes en langue anglais évoqués en introduction.

Les filiales d'entreprises étatiques, ExPace (CASIC) et China Long March Rocket (CLMR – CASC), disposent d'un capital souscrit nettement supérieur à celui des entreprises privées. Elles sont majoritairement détenues par des entités institutionnelles issues des groupes étatiques mères, et bénéficient de l'appui de fonds stratégiques nationaux, tels que le *National Military-Civil Fusion Industry Investment Fund*. Ce positionnement confère à ces entités un accès privilégié à des ressources financières stratégiques et à un soutien institutionnel renforcé.

L'entreprise CAS Space adopte un profil intermédiaire : son capital est majoritairement détenu par des structures affiliées à l'Académie des sciences (CAS), sans implication directe des fondateurs dans l'actionnariat. Quelques parts minoritaires proviennent d'investissements privés, ce qui renforce son positionnement hybride.

L’étude de l’implantation territoriale révèle une forte concentration des filiales dans certaines provinces, notamment Pékin, qui regroupe plus de la moitié des filiales des entreprises privées. D’autres zones, comme le Shandong, le Shaanxi ou le Zhejiang, attirent également plusieurs implantations, suggérant des stratégies différenciées, parfois influencées par des avantages industriels régionaux ou des incitations politiques locales. À l’inverse, les filiales des SOE sont concentrées dans des régions spécifiques, Hubei pour ExPace, Pékin pour CLMR, traduisant un modèle plus centralisé, possiblement en lien avec des dynamiques de protectionnisme local dans le premier cas.

Sur le plan des origines géographiques des investisseurs, l’analyse montre une nette domination de quatre pôles : Jiangsu, Pékin, Zhejiang et les investisseurs individuels (fondateurs et employés). L’origine provinciale des fonds ne coïncide pas toujours avec l’implantation des entreprises, ce qui suggère un certain découplage entre les logiques d’investissement et de localisation opérationnelle.

En conclusion, les structures d’actionnariat et d’implantation des entreprises reflètent des logiques institutionnelles distinctes. Les *minying* se caractérisent par une forte implication personnelle des fondateurs, des investissements fragmentés, et une diversification géographique notable. Les filiales d’entreprises d’État reposent sur des financements massifs d’origine institutionnelle et un ancrage territorial limité. CAS Space, pour sa part, illustre une configuration intermédiaire, mêlant contrôle institutionnel et ouverture partielle au capital privé.

Partie 4

Chapitre VII – Enquête de terrain

Ce chapitre présente les résultats de deux enquêtes de terrain conduites en Chine en avril-mai 2023 et 2024. Elles visaient à approfondir l'analyse des entreprises commerciales de lancement spatial, en s'appuyant sur une trentaine d'échanges réalisés avec des acteurs du secteur. L'objectif du chapitre est de confronter les hypothèses issues de la littérature et des documents réglementaires à l'expérience et aux discours collectés sur le terrain.

L'accès aux interlocuteurs s'est avéré plus aisé que prévu, remettant en question l'idée d'un secteur spatial chinois totalement opaque, en tout cas en ce qui concerne les entreprises privées, il a été possible de mener un grand nombre d'échanges en se présentant de manière transparente comme chercheuse française.

Les entretiens ont permis de confirmer l'existence de distinctions nettes entre différents types d'acteurs : les entreprises privées, les spin-offs de SOEs (notamment ExPace), et les entreprises à capital mixte issues de la CAS (en l'occurrence CAS Space). Les spin-offs d'entreprises publiques occupent un statut ambigu : bien que se présentant parfois comme commerciales, elles sont souvent perçues par les autres acteurs comme relevant encore du secteur public. Ce flou rejoint les analyses antérieures sur les catégories floues du « spatial commercial » en Chine.

Les rapports entre ces différents types d'acteurs s'avèrent plus frictionnels que ne le laisse entendre la littérature spécialisée présentée en Partie 1, qui insiste souvent sur leur complémentarité, un discours qui peut être qualifié de politiquement correct. Plusieurs entretiens évoquent au contraire des tensions, une certaine condescendance des SOE envers les entreprises privées, des obstacles à la collaboration, ainsi qu'une compétition pour les ressources humaines. Toutefois, ces relations incluent aussi des coopérations concrètes, notamment sous forme de relations client-fournisseur.

Le rôle de l'État, tant au niveau central que local, a été exploré plus en profondeur. D'apres les personnes interrogées, les politiques centrales ont d'abord été vagues et incitatives au milieu de la décennie 2010, laissant aux gouvernements locaux l'initiative de mettre en œuvre des dispositifs de soutien. Les gouvernements provinciaux ont ainsi joué un rôle moteur, notamment via la mise en place de parcs industriels ou d'incitations fiscales. Cette dynamique a souvent été décrite comme ascendante, avec une mobilisation entrepreneuriale spontanée, suivie d'une appropriation progressive par l'État central.

La méthodologie adoptée reposait sur des entretiens semi-directifs, menés exclusivement en mandarin, sans enregistrement audio afin de garantir la sécurité des personnes interrogées. Les entretiens ont été retranscrits à partir de prises de notes manuscrites, ce qui a pu limiter la précision des données, mais a facilité l'instauration d'un climat de confiance.

La distinction entre entreprises *minying* et entreprises publiques est omniprésente dans les discours recueillis. Certains interlocuteurs rejettent même le terme « spatial commercial », estimant qu'il masque des différences fondamentales entre ces types d'acteurs. Le cas des entreprises issues de la CAS est plus ambigu.

Les liens entre entreprises sont souvent ambivalents : les entreprises privées achètent des composants aux SOE, mais se heurtent parfois à des refus ou à une hostilité implicite. Certains cas emblématiques, comme l'annulation d'un contrat entre CASC et Landspace, illustrent ces frictions. D'autres témoignages font état de comportements de défiance, d'un manque de reconnaissance ou d'obstacles institutionnels dans la collaboration.

La circulation des talents entre secteur public et entreprises privées est un enjeu majeur. De nombreux cadres et techniciens des entreprises privées proviennent du secteur public. Le départ de ces profils est souvent perçu comme une perte pour les SOE, mais aussi comme un signe de dynamisme du secteur privé. Les profils formés à l'étranger ne peuvent généralement pas intégrer les SOE, ce qui constitue un avantage comparatif pour les entreprises privées.

Au-delà des relations inter-entreprises, les entretiens révèlent l'existence de cultures organisationnelles contrastées : hiérarchies rigides, lenteur bureaucratique et aversion au risque du côté des SOE ; structures plates, prise de risque et recherche de rentabilité dans les entreprises privées. Cette opposition se reflète dans les trajectoires des individus, leurs attentes professionnelles, et leurs perceptions des rôles à jouer par le spatial dit traditionnel et le spatial commercial.

Le rôle de l'État est apparu ambivalent : si l'on observe aujourd'hui une volonté plus affirmée de soutien à l'égard des entreprises commerciales, les premières années ont été marquées par un cadre flou et peu contraignant. Les politiques locales ont souvent précédé les initiatives centrales. Plusieurs interlocuteurs estiment d'ailleurs que les politiques actuelles sont encore mal adaptées aux spécificités du secteur spatial.

En somme, ce chapitre met en lumière un écosystème fragmenté, traversé de logiques concurrentes, où les dynamiques de marché coexistent avec des pratiques héritées de

l'économie administrée. Il offre un éclairage empirique précieux sur les enjeux humains, institutionnels et politiques de l'émergence d'un spatial commercial en Chine.

Chapitre VIII — Étude de la communication WeChat des entreprises de lancement spatial commercial : les formes de l'identité d'entreprise

Ce chapitre se penche sur les stratégies de communication déployées par les entreprises chinoises de lancement spatial commercial à travers leurs comptes officiels WeChat, sur une période de six mois (juillet–décembre 2023). L'objectif est d'examiner dans quelle mesure les différences observées en matière de structure capitalistique se traduisent également dans les formes discursives mobilisées par ces acteurs, dans un espace public numérique. La typologie déjà identifiée entreprises privées, filiales d'entreprises d'État (SOE) et structures à propriété mixte liées à l'Académie chinoise des sciences (CAS) est mobilisée pour structurer l'analyse.

La première partie du chapitre s'intéresse aux entreprises *minying*. Leur communication est caractérisée par la prédominance de contenus à forte technicité, centrés sur la démonstration des capacités de test, les essais de moteurs ou les étapes du développement de nouveaux lanceurs. Ces publications mettent en avant les avancées technologiques réalisées, dans un objectif à la fois informatif, promotionnel et possiblement pédagogique. L'iconographie est particulièrement soignée, intégrant des images et vidéos au soutien de textes comportant un contenu technique. Les tests sont toujours présentés comme des réussites, ce qui appelle une lecture critique quant à la nature promotionnelle de ces messages. En parallèle, quelques publications abordent des accords commerciaux, des recrutements ou la participation à des événements professionnels. Toutefois, leur fréquence demeure plus faible comparativement aux articles techniques.

À l'opposé, la communication de ExPace, filiale de CASIC, est marquée par une quasi-absence de publications à contenu technologique. Le corpus est dominé par des articles axés sur la vie interne de l'entreprise, en particulier la mise en scène des employés et les comptes rendus de réunions notamment de Parti. Les récits prennent la forme de portraits de salariés, de récits collectifs, ou d'événements internes mobilisant un vocabulaire épique, militaire, ou inspiré de l'idéologie officielle. Les photographies montrent systématiquement les employés au premier plan, avec des équipements souvent floutés. L'orientation générale de cette communication est endogène, visant à renforcer la cohésion interne et à valoriser l'engagement au sein du groupe. Ce positionnement contraste fortement avec celui des entreprises privées.

CAS Space, entreprise à capital mixte, adopte une posture hybride. Elle publie à la fois des contenus techniques sur ses avancées (proches en format et tonalité de ceux des entreprises privées), des éléments de vulgarisation scientifique à destination du grand public, ainsi que quelques contenus mettant en valeur ses ressources humaines. Elle se distingue par une forte présence dans des salons ou des événements de sensibilisation scientifique, parfois dans des formats très techniques. Cette orientation vers la communication publique pourrait s'expliquer par son statut affilié à un institut de recherche. Si des références à l'histoire spatiale chinoise ou au Parti communiste chinois sont présentes, elles demeurent plus discrètes et moins systématiques que dans le cas d'ExPace.

Au-delà de ces observations empiriques, le chapitre formule plusieurs hypothèses. Il suggère que les différences repérées dans les pratiques de communication reflètent des modèles économiques et des cultures d'entreprise distincts. Les entreprises privées, en recherche de financement et de contrats, ont intérêt à afficher leurs capacités techniques. À l'inverse, une entité comme ExPace, intégrée à un groupe étatique, pourrait se conformer à des normes internes de communication orientées vers le renforcement idéologique et la discipline organisationnelle. CAS Space se positionne entre ces deux pôles, adoptant une stratégie de communication duale, tournée à la fois vers les sphères internes et externes.

Enfin, le chapitre souligne la pertinence de WeChat comme objet d'étude. Bien qu'elle présente des limites — accès restreint aux non sinophones, biais de sélection, communication contrôlée — cette plateforme constitue une source précieuse pour analyser les représentations discursives construites par les entreprises elles-mêmes. L'analyse de ces publications vient enrichir les approches plus classiques basées sur les données quantitatives ou les entretiens de terrain, et confirme l'intérêt d'une lecture différenciée des acteurs du spatial commercial chinois.

Conclusion

Cette thèse s'est donné pour objectif d'analyser l'émergence et les caractéristiques des activités spatiales commerciales en Chine, en portant une attention particulière au secteur des lanceurs. Face à la relative rareté, et parfois à la superficialité, de la littérature en langue anglaise sur ce sujet, la recherche s'est appuyée sur des ressources documentaires en mandarin ainsi que sur deux enquêtes de terrain, articulant méthodes qualitatives et quantitatives. À travers cinq parties, elle propose une analyse plurielle et stratifiée du secteur chinois des lanceurs commerciaux, en retraçant sa construction intellectuelle, son encadrement politique, son évolution économique, ses structures financières et ses formes discursives. Ce qui se dégage

n’est pas une stratégie industrielle cohérente et centralisée, mais un écosystème composite, fragmenté, et parfois contradictoire, façonné par des acteurs concurrents, des politiques ambiguës et des incitations inégalement distribuées.

Plusieurs conclusions générales peuvent être tirées de cette analyse. Premièrement, l’évolution du secteur des lanceurs commerciaux en Chine s’interprète davantage comme un processus émergent que comme le fruit d’une planification concertée. Si les autorités centrales affichent un soutien croissant à l’égard de l’espace commercial, ce processus n’a pas suivi un schéma linéaire ou unifié, combinant au contraire incitations descendantes, initiatives locales opportunistes, et dynamiques entrepreneuriales ascendantes. Deuxièmement, la catégorie même de « commercial » se révèle instable et contestée. Entreprises privées, entités affiliées aux SOE, et structures issues de la CAS revendiquent ce qualificatif, bien que leurs pratiques, leurs sources de financement et leurs logiques institutionnelles diffèrent largement. Troisièmement, l’implication de l’État est centrale mais souvent asymétrique. Par le biais de la représentation politique, de l’accès au financement ou du contrôle sur les définitions, les acteurs historiques conservent des avantages structurels importants, compliquant une lecture en simples termes de libéralisation ou de privatisation.

Enfin, cette thèse souligne la nécessité de déconstruire les catégories de « public » et de « privé » dans l’analyse du secteur spatial chinois. Une telle approche permet non seulement de mieux saisir la diversité des acteurs impliqués, mais aussi de nuancer les dichotomies simplistes souvent mobilisées dans les analyses en langue anglaise. Loin de ces oppositions figées, émerge un écosystème complexe, traversé par l’hybridité, les tensions et l’expérimentation.

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