UNIVERSITÉ DE LORRAINE

AVERTISSEMENT

Ce document est le fruit d'un long travail approuvé par le jury de soutenance et mis à disposition de l'ensemble de la communauté universitaire élargie.

Il est soumis à la propriété intellectuelle de l'auteur. Ceci implique une obligation de citation et de référencement lors de l'utilisation de ce document.

D'autre part, toute contrefaçon, plagiat, reproduction illicite encourt une poursuite pénale.

Contact : ddoc-theses-contact@univ-lorraine.fr

LIENS

Code de la Propriété Intellectuelle. articles L 122. 4
Code de la Propriété Intellectuelle. articles L 335.2- L 335.10
http://www.cfcopies.com/V2/leg/leg_droi.php
http://www.culture.gouv.fr/culture/infos-pratiques/droits/protection.htm

UNIVERSITÉ DE LORRAINE

L'École Doctorale Sciences Juridiques, Politiques, Économiques et de Gestion

Centre Européen de Recherche en Économie Financière et Gestion des Entreprises

Internationalization and Digitalization of micro-, small- and medium-sized enterprises

A thesis by publications submitted in fulfilment of the requirements for the degree of

DOCTOR FROM THE UNIVERSITY OF LORRAINE

Mention: "Management Sciences"

by Annaële Hervé

Jury members

	Mrs Martine BOUTARY	Professor, Toulouse Business School
	Mrs Christine DEMEN MEIER	Professor, Les Roches Crans-Montana (Switzerland)
	Mrs Vinciane SERVANTIE	Professor, Universidad de los Andes (Colombia)
	Mr José Aramis MARIN PÉREZ	Lecturer, University of Lorraine
Thesis director	Mr Christophe SCHMITT	University Professor, University of Lorraine
Thesis co-director	Mr Rico BALDEGGER	Professor and Director, School of Management Fribourg (Switzerland)

ACKNOWLEDGMENTS

This thesis is the compilation of research conducted in a partnership between the University of Lorraine and the School of Management Fribourg. Completion of this research would not have been possible without the help of the many people who have contributed to the success of this project. I would like to take this opportunity to express how much I appreciate the support I have received during the development of the dissertation. Throughout the research, I had the chance to take part in very interesting meetings and I would like to warmly thank all the people who kindly gave me their time to guide me and answer my questions.

Foremost, I would like to thank my supervisor, Professor Christophe Schmitt and my co-supervisor, Professor Rico Baldegger, for their confidence in recruiting me to the PhD program and for their support throughout the thesis process. I also would like to thank them for giving me the chance to pursue my ambitions in research and teaching. I have learnt so much from their feedback and sharing of ideas during the whole research process. They inspired me a lot with their vision of the entrepreneur and I am deeply grateful for their involvement and valuable contribution in the development of the thesis. I would also like to thank the members of the jury for their availability and their willingness to be part of this thesis. My sincere thanks to Professors Martine Boutary, Christine Demen Meier, Vinciane Servantie and José Aramis Marin Pérez.

I would like to express my deep gratitude to my colleagues from the School of Management Fribourg. Their support and encouragement during the research motivated me to reach my goals. Many thanks to Marco Biscaro, Leïla Braïdi, Laurence Casagrande-Caille, Laura Jan Du Chêne, Raphaël Gaudart, Anja Jenny, Jeanne Moënnat, Caroline Reeson, Gabriel Simonet, Damien Vieli and Lucia Zurkinden for their attention, friendship and support. I owe a debt of gratitude to Charlotte Raemy for her precious proofreading and helpful advice. I would also like to thank Dr. Pascal Wild for sharing his invaluable advice, insightful answers and experience, as well as to all my colleagues from the research and administrative departments of the School of Management Fribourg for their inspiration and encouragement. Many thanks to Dr. Maurizio Caon, Dr. Bruno Pasquier and Dr. Philippe Regnier for their constant support. I also received valuable help from Mélanie Thomet, Emanuele Meier, Samuele Meier, as well as Jahja Rrustemi on all aspects related to the statistical part of the thesis. My sincere thanks for their time, patience and priceless expertise. Finally, many thanks to Dr. Marilyne Pasquier and Dr. Etienne Rumo for their sharing and constant source of encouragement.

I am deeply grateful to the teams of the University of Lorraine, CEREFIGE and the doctoral school SJPEG for their professionalism and collaboration. Many thanks to Sandrine Claudel-Cecchi for her kindness, availability and help. I would like to express my sincere thanks to Dr. Manon Enjolras and Dr. José Aramis Marin Pérez for sharing their experience and encouragement all along the thesis. I have learned a lot from our very interesting discussions. I am also grateful to my individual monitoring committee and I would like to thank Dr. Fana Rasolofo-Distler and Dr. Julien Husson

for their time and valuable advice. Lastly, it was a great pleasure to meet the PeeL team and to learn more about their entrepreneurial projects and ideas. My sincere thanks for their warm welcome.

I also received an incredible amount of help from many researchers, scholar communities and participants I have met at various seminars and doctoral consortia. Many thanks to them and to the organizers of the Greater Region PhD Workshop, NITIM Summer School, CIFEPME, ICSB World Congress, McGill International Entrepreneurship Conference and G-Forum. I am also indebted to the TIM Review team for their trust and precious collaboration. In particular, I would like to express my deep gratitude to Dr. Stoyan Tanev for believing in my work.

Finally, this research project would have not been possible without the love and the support of my family and friends. They deserve my deepest gratitude for their constant encouragement. I am profoundly grateful to have such amazing loved ones around me. They are a deep source of inspiration and candid guidance. My sincere and heartfelt thanks to all of you, and particularly *à Toi*.

TABLE OF CONTENT

LIST OF FIGURES AND TABLES vi

ABSTRACT vii

RÉSUMÉ viii

1 CHAPTER – INTRODUCTION 1

1.1 RESEARCH PROBLEM 1

1.2 LITERATURE REVIEW 4

1.2.1 Digital entrepreneurship 4

1.2.2 Internationalization of firms 7

1.2.3 Entrepreneurial orientation 10

1.2.4 Self-concept traits 12

1.3 RESEARCH FRAMEWORK 16

1.3.1 Research aim and scope 16

1.3.2 Epistemological approach 22

1.3.3 Research methodology 23

1.4 THESIS OUTLINE AND MAIN RESULTS 30

1.4.1 Article #1 31

1.4.2 Article #2 33

1.4.3 Article #3 34

1.4.4 Thesis main result 36

2 CHAPTER – ARTICLE #1 37

2.1 ABSTRACT 37

2.2 INTRODUCTION 37

2.3 LITERATURE REVIEW 39

2.3.1 Internationalization of firms 39

2.3.2 Digitalization in firms 40

2.3.3 Digital internationalization 41

2.4 METHODOLOGY 41
2.4.1 Data collection 41
2.4.2 Data analysis 42
2.5 RESULTS 42
2.5.1 Costs, accessibility, resources and competences 42
2.5.2 Market knowledge 43
2.5.3 Distance and location 44
2.5.4 Relational competences and partner networks 44
2.6 DISCUSSION 45
2.7 CONCLUSION AND AGENDA FOR FURTHER RESEARCH 47
2.8 APPENDIX 49
3 CHAPTER – ARTICLE #2 51
3.1 ABSTRACT 51
3.2 INTRODUCTION 51
3.3 LITERATURE REVIEW AND HYPOTHESES 52
3.3.1 International Entrepreneurship 52
3.3.2 IE and Entrepreneurial Orientation 53
3.3.3 Digital Entrepreneurship 54
3.3.4 DE and the role of entrepreneurs 55
3.4 METHODOLOGY 57
3.4.1 Sample and data collection 57
3.4.2 Measures 58
3.5 RESULTS 59
3.5.1 Hypothesis 1: Degree of digitalization and EO 59
3.5.2 Hypothesis 2: EO and the intensity of internationalization 60
3.6 DISCUSSION 61

3.7 CONCLUSION 63
3.8 IMPLICATIONS, LIMITATIONS AND FURTHER RESEARCH 64
4 CHAPTER – ARTICLE #3 65
4.1 ABSTRACT 65
4.2 INTRODUCTION 65
4.3 THEORY, HYPOTHESES AND RESEARCH FRAMEWORK 67
4.3.1 Digital Entrepreneurship 67
4.3.2 At the firm level – Entrepreneurial orientation in a digital context 68
4.3.3 At the individual level – Entrepreneurial self-concept traits in a digital context 70
4.3.4 Research framework 73
4.4 METHODOLOGY 74
4.4.1 Sample and data collection 74
4.4.2 Measures 75
4.5 RESULTS 76
4.5.1 Descriptive statistics and construct reliability 76
4.5.2 Testing our hypotheses 76
4.6 DISCUSSION 78
4.6.1 Theoretical and practical implications 79
4.6.2 Limitations and further research 80
4.7 CONCLUSION 81
5 CHAPTER – CONCLUSION 82
5.1 RESEARCH SYNTHESIS 82
5.2 RESEARCH AND MANAGERIAL CONTRIBUTIONS 93
5.3 LIMITATIONS AND RESEARCH PERSPECTIVES 96
6 REFERENCES 98

LIST OF FIGURES AND TABLES

Figure 1 – Uppsala model: traditional model of internationalization 8

Figure 2 – Theoretical framework overview 15

Figure 3 – Overall research questions 21

Figure 4 – Methodological approaches 24

Figure 5 – Research model of the first phase of quantitative study 29

Figure 6 – Research model of the second phase of quantitative study 29

Figure 7 – Overall thesis structure 30

Figure 8 – First representation of the overall conceptual process 36

Figure 9 – Compiling the results of the three articles 87

Figure 10 – Final version of the overall conceptual process 89

Table 1 – Digital globalization 1

Table 2 – Sub-research questions 17

Table 3 – Sample demographics 27

Table 4 – Overview of scientific papers 35

ABSTRACT

In recent years, the advent of digital technologies has radically transformed the business world and societal paradigms. As the digitalization phenomenon causes numerous changes, firms face disruptive transformation in their functions and value proposition in order to stay competitive in such a fast-moving environment. The current transformations are particularly disruptive with regard to the new reality of digitally connected global trade. By creating new virtual market spaces and resizing all the business cross-border economies, digitalization is reshaping international trade. However, although entrepreneurs and academics need to be aware of associated outcomes in order to shape emerging opportunities, traditional theories on international business do not specifically address the pervasive effects of digital technologies and theoretical models do not seem to be sufficiently adapted to the current digital context. In that regard, the purpose of this paper-based dissertation is to study the internationalization and digitalization of firms. It aims to contribute to the knowledge of how to carry out entrepreneurial and competitive activities on a national scale through the use of digital technologies. By linking insights from the literature on internationalization and digitalization of firms, the first article sheds light on how the digital context is currently transforming the internationalization process of firms. It also provides a better understanding of how the use of digital technologies can lead to new forms of internationalization as well as new opportunities in foreign markets. On the basis of a quantitative survey, the second and third papers investigate in more detail the relationship between digitalization and internationalization of firms and link these dimensions through entrepreneurial behaviors of firms and individuals. The second article addresses the behaviors of firms and builds a research model that tests the relationships between key variables on digitalization, entrepreneurial behaviors (operationalized to reflect the concept of entrepreneurial orientation) and internationalization of firms. The results provide several suggestions about how the use of digital technologies might reinforce entrepreneurial orientation of firms that, in turn, enhance their internationalization propensity. The third paper focuses on entrepreneurial behaviors of individuals and builds a model of parallel mediation. The research model examines how the behaviors of entrepreneurs mediate the relationship between the digitalization and the entrepreneurial orientation of internationalizing firms. In elaborating the results, the third paper outlines the major role of individuals' behaviors to exploit the opportunities afforded by the use of digital technologies and shape the firms' strategic posture. By investigating entrepreneurial behaviors of firms and individuals, the thesis suggests linking the dimensions of interest through an overall conceptual process. The central contribution is the development of this model that demonstrates how the use of digital technologies might impact the firms and individual entrepreneurial behaviors and how this might shape new opportunities to enhance a propensity for internationalization. The articles compiled in the thesis address the current lack of understanding in the significant digital phenomenon that is completely transforming global trade. Its results and propositions aim to participate in the scientific debate and improve managerial practices of carrying out entrepreneurial and competitive global activities in a digital context.

RÉSUMÉ

Ces dernières années, l'avènement des technologies numériques a radicalement transformé le monde des affaires et les paradigmes sociétaux. Le phénomène de la numérisation entraîne de nombreux changements. Pour rester compétitives, les entreprises font face à une transformation radicale de leurs fonctions et de leur proposition de valeur. Les changements actuels sont particulièrement disruptifs au regard de la nouvelle réalité du commerce international "connecté". En créant de nouveaux espaces de marchés virtuels et en redimensionnant toutes les économies transfrontalières des entreprises, la numérisation bouleverse les échanges à travers le monde. Cependant, bien que les entrepreneurs et les chercheurs scientifiques doivent prendre conscience des résultats associés pour façonner les opportunités émergentes, les théories scientifiques sur le commerce international ne traitent pas spécifiquement des effets omniprésents des technologies numériques. À cet égard, la compilation des articles du travail de recherche vise à combler ces lacunes et à contribuer au développement de connaissances sur l'accomplissement d'activités internationales qui soient entrepreneuriales et compétitives grâce à l'utilisation des technologies numériques. En liant les points de vue théoriques sur l'internationalisation et la numérisation des entreprises, le premier article met en lumière la manière dont le contexte numérique transforme le processus d'internationalisation des entreprises et conduit à de nouvelles opportunités sur les marchés étrangers. Sur la base d'une enquête quantitative, les deuxième et troisième articles visent à explorer l'impact de l'utilisation des technologies numériques sur les comportements entrepreneuriaux, tant à l'égard de l'entreprise que de l'individu. Le deuxième article aborde les comportements des entreprises et construit un modèle de recherche qui teste les relations entre les variables clés de la numérisation, des comportements entrepreneuriaux et l'internationalisation des entreprises. Plusieurs suggestions sont formulées sur la manière dont l'utilisation des technologies numériques pourrait renforcer les comportements entrepreneuriaux des entreprises qui, à leur tour, sont indispensables pour améliorer la propension d'internationalisation. Le troisième article se concentre sur les comportements des individus et construit un modèle de médiation parallèle. Le modèle de recherche examine comment les comportements des entrepreneurs interviennent dans la relation entre la numérisation et l'orientation stratégique des entreprises actives à l'international. Les résultats démontrent le rôle majeur des comportements des individus pour exploiter les opportunités offertes par l'utilisation des technologies numériques et façonner l'orientation stratégique des entreprises. En enquêtant sur les comportements entrepreneuriaux des entreprises et des individus, l'étude propose de relier les dimensions d'intérêt à travers un processus conceptuel global. La contribution centrale est le développement de ce modèle qui démontre comment l'utilisation des technologies numériques impacte les comportements entrepreneuriaux des entreprises et des individus pour créer de nouvelles opportunités et renforcer l'intensité d'internationalisation de leurs activités. Les articles compilés du travail de recherche traitent du manque actuel de compréhension de l'important phénomène numérique qui transforme le commerce mondial. Les résultats et propositions formulés visent à participer au débat scientifique et à améliorer les pratiques managériales pour l'accomplissement d'activités internationales dans un contexte numérique qui soient entrepreneuriales et compétitives.

1 CHAPTER – INTRODUCTION

1.1 RESEARCH PROBLEM

With the advent of digital technologies, companies and society are evolving at the heart of transformations and all institutions are facing a fundamental need for radical changes in their structure and operating methods. They are experimenting a new wave of digitalization (Legner et al., 2017) characterized by the emergence and convergence of numerous digital technologies in the domains of artificial intelligence, internet of things, robotics, big data, cloud, mobile applications, 3D-printers, augmented and virtual reality, as well as blockchain. The current transformations are particularly disruptive with regard to the new reality of digitally connected international trade. For decades, globalization was defined through trade in goods and services between countries. While the dynamic of these flows is currently moderate, globalization is not slowing down. In contrast, huge data flows are constantly crossing borders and their volume has increased considerably these last years (Manyika et al., 2016). Consequently, globalization is evolving at the same pace as these exchanges of information and data across foreign markets.

Nowadays, the digitalization of international trade is reshaping *who is participating, how business is done across borders, how rapidly competition moves, and where the economic benefits are flowing* (Manyika et al., 2016).

Table 1 – Digital globalization

20th century globalization	**21st century globalization**
Physical goods, capital, and labor-intensive flows	Data, information and knowledge flows
Exchanges of mainly monetized transactions	Greater exchanges of free content and services
Mostly between advanced economies and multinational companies	More participation of emerging economies, SMEs, and individuals
Need for transportation infrastructure	Need for digital infrastructure
Slow diffusion of information across borders	Instant global diffusion and access to information
Innovation capacity and flows from advanced to emerging economies	Innovation capacity and flows in both directions

Source: modified from Manyika et al., 2016

By creating new virtual market spaces and resizing all the business cross-border economies, digitalization is reducing costs, shortening transactions and increasing market knowledge through greater interactions. In that regard, the use of digital technologies has the potential to profoundly impact firms' operating functions as well as geographic configurations and changes the way firms arrange production and engage with customers (Coviello et al., 2017). As acknowledged by Coviello and colleagues (2017), emerging technologies have a significant effect on the internationalization process of

firms in terms of time and pace of internationalization; they have reshaped the entry mode choices, democratized global consumption, paved the way to a wide database for knowledge acquisition in foreign markets, improved communication as well as information exchange and facilitated cross-border transactions by increasing intangible flows and reducing location dependences. Furthermore, combined with Web 2.0 technologies, the use of internet of things, robotics or 3D-printers could potentially transform the location and organization of manufacturing production worldwide. It will lead firms to base their production decisions more on proximity to customers than on production costs (Strange and Zucchella, 2017; Hannibal and Knight, 2018). Following these insights, the use of digital technologies has a significant impact on the internationalization process and provides firms, especially micro-, small- and medium-sized enterprises (MSMEs), new concrete opportunities on a global scale. Because those firms are often faced with a lack of resources, the use of digital technologies, such as online sales platforms, allows them to experiment with new internationalization paths and to increase their agility in targeting markets and expanding their network (Foscht et al., 2006; Bell and Loane, 2010; Mathews et al., 2016; Watson et al., 2018). By creating more fluidity and nonlinearity across time and space, digital technologies allow more variability in entrepreneurial activities and in value creation (Nambisan, 2017). On one hand, they have rendered entrepreneurial processes and outcomes less bounded and allow more flexibility and continuous improvement in activities. On the other hand, the use of digital technologies allows firms to involve a more diverse set of actors in activities in order to bring together new ideas and resources and, thus leads to more collective ways of conducting entrepreneurship (Nambisan, 2017). As input for entrepreneurship opportunities (Giones and Brem, 2017), the use of digital technologies in internal and external operating functions may emphasize entrepreneurial behaviors of firms and thus, consolidate their strategic posture in foreign markets.

Although technological changes offer several opportunities to firms in foreign markets over time, they also accentuate the competitive landscape all around the world (Porter, 1985). This assumption is especially true given the digital context (Manyika et al., 2016). Relying on wide scalability and powerful resources for information processing and storage, digitalization is creating an enabling but highly competitive business environment. The digital context reduces many barriers to the global marketplace and thus enables new players to participate and compete in international trade (Manyika et al., 2016). In such a competitive environment, firms are required to adapt their efforts by aggressively trying to maintain a market advantage and adopt strong entrepreneurial behaviors (Covin and Slevin, 1989). Furthermore, as a central driver to taking advantage of the opportunities provided by technological changes and to defining competitive strategies, individuals are also required to adopt such entrepreneurial behaviors (Schumpeter, 1934). In order to better understand and anticipate the growth opportunities pursued by an entrepreneur, the individual perceptions that define entrepreneurial behaviors in terms of what the company can and cannot accomplish with its technological resources are paramount (Gruber et al. 2012). In that regard, entrepreneurial behaviors of firms and individuals might to be a relevant approach to consider at the intersection between the use of digital technologies and the internationalization of MSMEs.

While the use of digital technologies allows firms to be immediately active on a global scale, in terms of scientific research, existing theories on internationalization may not appropriately account for the pervasive effects of technological advances (Andersson et al., 2014; Welch and Paavilainen Mäntymäki, 2014; Knight and Liesch, 2016; Welch et al., 2016; Coviello et al., 2017; Kriz and Welch, 2018; Hult et al., 2020). Based mainly on linear and sequential processes of internationalization, traditional models of internationalization assume that knowledge should be acquired gradually over time (Johanson and Vahlne, 1977). Although these authors have acknowledged in a recent publication that business exchange has reshaped the business landscape and that proactive and entrepreneurial behaviors are primordial in response to change (Vahlne and Johanson, 2017), they have not explicitly addressed the key factors of technological changes in internationalization patterns of firms (Coviello et al., 2017). In a modern digitalized world, it is difficult to accept costs or access to information as internationalization constraints (Welch et al., 2016). It is, thus, fundamental to study the role of digitalization in recognizing and exploiting future opportunities in foreign markets (Knight and Liesch, 2016). In scientific literature, it has been acknowledged that few studies have reported on purely digital technologies to theoretically understand and empirically test their attributes in international business management (Autio and Zander, 2016; Hannibal and Knight, 2018; Watson et al., 2018). Nonetheless, a small community of researchers are beginning to investigate digitalization and internationalization patterns (Autio and Zander, 2016; Brouthers et al., 2016, 2018; Coviello et al., 2017; Hagsten and Kotnik, 2017; Strange and Zucchella, 2017; Hannibal and Knight, 2018; Kriz and Welch, 2018; Neubert, 2018; Ojala et al., 2018; Stallkamp and Schotter, 2018; Watson et al., 2018; Wittkop et al., 2018; Banalieva and Dhanaraj, 2019; Chen et al., 2019; Enjolras et al., 2019; Monaghan et al., 2019; Hult et al., 2020). However, most of these studies have tested the internationalization patterns of technological firms and paid little attention to empirically measuring how digital technologies affect the activities of established internationalizing MSMEs.

This thesis aims to contribute to the body of knowledge on entrepreneurship by studying the digitalization and internationalization of established MSMEs. As existing research in entrepreneurship with regard to the role of digital technologies in shaping entrepreneurial opportunities, decisions, actions, and outcomes is overdue (Nambisan, 2017; Kraus et al., 2019), the compilation of research papers on the thesis aspires to close the most urgent gaps in current literature by addressing the three dimensions of interest: digitalization, internationalization and entrepreneurial behaviors. The following sections provide the state-of-the-art scientific literature as well as the aims, methods of data collection, outline and main results of the overall research. The general introduction is followed by the three scientific papers addressing the research question and the final concluding chapter synthetizes the findings and contributions of the thesis.

1.2 LITERATURE REVIEW

The research is structured around five theoretical dimensions related to the field of entrepreneurship. At the company level, this thesis is based on the foundations of the research streams of "digital entrepreneurship" (DE), "international entrepreneurship" (IE) and "entrepreneurial orientation" (EO). At the individual level, the research is established around two main self-concept traits; "self-efficacy" and "locus of control". The following sections aim to provide a general foundation of each dimension and detail certain relevant aspects for the overall thesis. Because it is the main dimension of the research, the section begins with theoretical insights related to the digital context in which internationalizing firms are evolving. Second, the research uses IE and general insights on international business (IB) research to present theoretical foundations related to the internationalization patterns of firms. This section introduces the main research gap that questions the role of digitalization in creating and exploiting opportunities in international trade (Knight and Liesch, 2016; Coviello et al., 2017; Kriz and Welch, 2018). The third part is based on the firms' entrepreneurial behavior EO and presents the concept as well as its importance in linking digitalization and internationalization. The fourth and fifth sections are based on the individuals' entrepreneurial behaviors and provide a comprehensive explanation of the self-concept traits investigated.

1.2.1 Digital entrepreneurship

As an important issue for the economic development of societies and businesses, digitalization is starting to be addressed at a scientific level in the fields of entrepreneurship and management research (Kraus et al., 2019). The thesis is built on early research in DE that acknowledges entrepreneurship behaviors and entrepreneurs as an intrinsic part of the digital context. DE, as a concept in scientific research, emerged a decade ago at the intersection of digital technologies and entrepreneurship. Based on the theoretical foundation of entrepreneurship which involves recognizing, seizing and transforming opportunities into marketable goods or services to create new value, DE can be seen a subcategory of entrepreneurship "*in which some or all of what would be physical in a traditional organization has been digitized*" (Hull et al., 2007). DE specifically aims at investigating digital technologies and their unique characteristics in shaping entrepreneurial pursuits (Nambisan, 2017). In the literature, the use of digital technologies is recognized as input for entrepreneurship opportunities (Giones and Brem, 2017). Within scientific research, DE can be defined as "*the pursuit of opportunities based on the use of digital media and other information and communication technologies*" (Davidson and Vaast, 2010). Although DE is of growing interest in the scholarly literature (Hull et al., 2007; Davidson and Vaast, 2010; Giones and Brem, 2017; Nambisan, 2017; Le Dinh et al. 2018; Hsieh and Wu, 2019; Kraus et al., 2019; Recker and von Briel, 2019), the field is still struggling to provide a consolidated and broadly accepted definition of the concept (Kraus et al., 2019). The thesis applies the definition from Davidson and Vaast (2010), which is sufficiently broad to capture most of the research conducted in the domain.

Digital technologies have a growing paradigm-shifting role in entrepreneurship. The origin of this research stream emerged following the rapid technological advances of recent years in several aspects of innovation and entrepreneurship. Because digital technologies create more fluidity and nonlinearity across time and space, their use completely transformed the very nature of entrepreneurship (Nambisan, 2017). As acknowledged by Nambisan (2017), the use of digital technologies has redesigned the nature and source of uncertainty inherent in entrepreneurial activities. According to this author, digitalization has changed two major assumptions about the current understanding of entrepreneurial processes (related to the spatial and temporal boundaries of entrepreneurial activities) and outcomes (related to the structural boundaries of the product and service). First, it has rendered entrepreneurial processes and outcomes less bounded and allows more flexibility and continuous improvement in activities. Second, it allows a more diverse set of actors to be involved in activities in order to bring together new ideas and resources: this leads to more collective ways of conducting entrepreneurship. In the same context, other authors highlighted how the structural connections of digital technologies that make them interactive allow firms to improve existing functions or even to achieve new ones thanks to the development of digital affordances (Autio, 2017; von Briel et al., 2018). This interactive aspect also provides opportunities for innovative collaboration, strategic alliances, co-creation, open innovation, networking and creativity (Bell and Loane, 2010). In this respect, the use of digital technologies changes the locus of entrepreneurial agency and allows companies to follow a less centralized and more distributed approach to share value (Nambisan, 2017). By involving a various collection of actors in entrepreneurship initiatives, the role of founders changed. Entrepreneurs are no longer alone in undertaking operations, from the idea inception to its realization (Nambisan, 2017).

As outlined by Kraus and colleagues (2019), DE is of high topicality as the development and advances in technologies provide a plethora of opportunities for entrepreneurs. Consequently, entrepreneurs need to be familiar with the role of digital technologies in order to be ready for sustainable innovations and identify emerging opportunities (Kraus et al., 2019). Nevertheless, despite its significance, limited efforts have been made in theorizing opportunities, challenges and success factors of DE and literature on the topic is quite scarce (Nambisan, 2017; Kraus et al., 2019). Researchers in entrepreneurship have overlooked the role of digital technologies in entrepreneurial activities and, given the rapid and disruptive change caused by digitalization, it is paramount today to study the role of specific aspects of digital technologies in shaping entrepreneurial opportunities, decisions, actions, and outcomes (Nambisan, 2017).

1.2.1.1 Digitalization, digital technologies and digital transformation

By linking research work to information technology, management and DE, the thesis provides conceptual clarities of some key concepts related to digitalization, digital technologies and digital transformation in firms. Often faced with terminological confusion, scientists make a distinction between "digitization" and "digitalization". These are two closely related conceptual terms, but which express different purposes. According to Tilson et al., (2010) digitization is a "*technical process*" that makes technologies digital. In other words, it involves converting something analog or physical

to a digital format. Once digitized, the information is standardized in a digital format and can be processed by the same technologies. As digital devices today are able to connect, communicate, store and process numerous types of information, digitization provides numerous opportunities. However, the widespread use of digital technologies implies new patterns that accompany each new infrastructural technology. In that regard, digitization differs from digitalization, which is "*a sociotechnical process of applying digitizing techniques to broader social and institutional contexts that render digital technologies infrastructural*" (Tilson et al., 2010). In other words, digitalization is the application of digital technologies within an organization, economy and society. As Legner and colleagues (2017) highlighted in their research, we have seen different waves of digitalization that have fundamentally transformed our society. From the technologies that have replaced paper with computer to the Internet as a global communication infrastructure, we are experiencing the third wave of digitalization (Legner et al., 2017).

This wave is characterized by the emergence and converging of many innovative technologies in the domains of robotics, artificial intelligence, the internet of things, mobile applications, augmented and virtual reality, big data, cloud, 3D-printers, blockchain, nanotechnology, biotechnology and quantum computing. Emerging technologies are creating an enabling business environment based on powerful information processing and storage resources. Furthermore, as technologies have the ability to connect people to each other, connect people with machines and connect machines to each other, they feed each other and create broad networks and community. In order to build and fuel digital technologies, the key element is the data (Witten et al., 2016). By collecting these data from different sources and processing them through predictive algorithms, firms can improve decision-making purposes, such as assessing current conditions and predicting future market attractiveness and customer behaviors (Witten et al., 2016; Neubert, 2018). With such evidence, firms can enable effectiveness, competitiveness, adaptation to current market expectations, as well as development of user-centric and knowledge-driven products or services. Digital technologies can be applied in numerous ways. For instance, artificial intelligence can be employed to optimize processes, to improve production and distribution operations, to enhance managerial decisions for market entry, to target new customers more effectively, to select relevant partners, to supplement advertising strategies, to take better pricing decisions, to customize offers and to make demand predictions (Li et al., 2018; Watson et al., 2018; Aagaard et al., 2019; Kraus et al., 2019). Other major advances are 3D-printers that revolutionize manufacturing techniques in terms of production, costs, localization and customization (Hannibal and Knight, 2018), as well as internet of things, that allows machines to communicate and interact through embedded sensors capable of collecting and processing data in smart products and devices (Rüßmann et al., 2015). Finally, blockchain technology is a significant technological advance that might completely change current economic and financial paradigms. As an open, distributed ledger that records transactions between two parties efficiently and in a verifiable and permanent way (Iansiti and Lakhani, 2017), blockchain provides firms new opportunities for the storage and transmission of information in a transparent and secure way that operates without third parties.

However, even if these technologies are important enablers, their application alone cannot make a company digital. Except for firms that are born digital, many established companies still have to master the use of digital technologies. Because the implementation of smart and connected technologies triggers a change in the business functions, firms are faced with a transformation across their entire organization and activities (Bharadwaj et al., 2013; Matt et al., 2015; Porter and Heppelmann, 2015; Autio et al., 2018; Li et al., 2018; Aagaard et al., 2019; Kraus et al., 2019). The attributes of purely digital technologies introduce completely new possibilities in terms of speed and connectivity and enable much more than simply improving operations; emerging technologies allow firms to seize opportunities in order to create new value proposition (Ross et al., 2017). However, digital transformation is primarily a managerial concern rather than a technical issue (Li et al., 2018). This depends closely on the entrepreneur's ability to recognize and exploit opportunities in order to move away from previous cognitive models and change thinking patterns. Implementing such technologies involves changing the behavior and actions of entrepreneurs to take advantage and continually reassess the potential of the opportunities encountered (Nambisan, 2017).

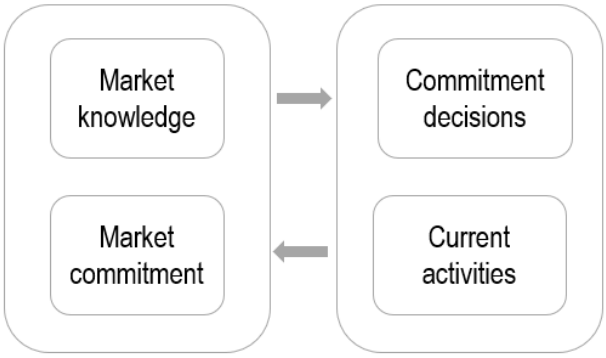
There are two steps in a digital transformation; become digitized and become digital (Ross et al., 2017). The first step occurs at the operational level and involves standardizing business processes as well as optimizing operations by implementing technologies and software (Ross et al., 2017). The second step involves the use of purely digital technologies to articulate, target and personalize alternative offers in order to define a new value proposition (Ross et al., 2017). In this respect, firms become digital by combining current capabilities with capabilities enabled by digital technologies. Thus, they can seize the opportunity to redesign their business model and activities with a *visionary digital value proposition* (Ross et al., 2017; Aagaard et al., 2019; Kraus et al., 2019). The two-fold steps of transformation can occur at various levels of the internal and external dimensions of firms. These dimensions can be categorized through four thematic areas; at the internal level, transformation occurs within process and infrastructure as well as people and culture, while, at the external level, the transformation arises among digital sales and customer involvement (Greif et al., 2017). In the research, the internal dimensions refer to the use of digital technologies to optimize operations, train staff and build a digital culture that involves all the human resources in the process of transformation. The external dimensions are related to customers' experience (via sales channels) and involvement in the firms' entrepreneurial activities. These kinds of transformation deal with a more radical change than adapting existing processes and involve far-reaching implications, such as a disruptive redesign of the entire business model.

1.2.2 Internationalization of firms

After compiling conceptual insights into the digital context, this thesis focuses on internationalization patterns of MSMEs. The research is based mainly on IE and uses some major theoretical foundations from IB in order to extend the theoretical scope. The following section reviews main concepts related to these research fields. In the scientific literature, the internationalization of firms becomes an increasingly widespread field of research. Over time, multiple

theoretical perspectives have addressed the internationalization patterns of firms. Mainly based on the attributes of large firms, these internationalization approaches have been discussed among scholars. One of the most popular theoretical models is the stage model. Commonly known as the Uppsala model, this approach considers internationalization as a linear and sequential process in which knowledge is gradually acquired over time through experience (Johanson and Vahlne, 1977). At its origin, this model (Figure 1) is built on four sequential stages including market knowledge (general and experiential), commitment decisions, current activities, and market commitment experience (Johanson and Vahlne, 1977).

Figure 1 – Uppsala model: traditional model of internationalization



Source: from Johanson and Vahlne (1977)

Even if the theorizing inherent in the Uppsala model has evolved over the years, some international business scholars are critical of the sequential feature of internationalization and relativize the universality of the model (Sullivan and Bauerschmidt, 1990; Andersen, 1993; Forsgren and Hagström, 2007; Andersson et al., 2014; Welch and Paavilainen Mäntymäki, 2014; Knight and Liesch, 2016; Welch et al., 2016; Coviello et al., 2017; Kriz and Welch, 2018; Hult et al., 2020). Scholars are questioning the progressive engagement needed in foreign markets as a result of the widespread phenomenon of entrepreneurial MSMEs and the current technological advances that are revolutionizing internationalization patterns. While borders are now dematerialized (Stallkamp and Schotter, 2018), it is hard to accept costs or access to information as internationalization constraints in a modern digitalized world (Welch et al., 2016). As acknowledged by Coviello and colleagues (2017), *digitalization has the potential to impact the internationalization process in terms of the timing, pace, and rhythm of internationalization, location and entry mode choice, foreign market learning and knowledge recombination, accessibility of requisite resources and capabilities in home and host markets, and the firm's ability to manage the liabilities of foreignness and outsidership.* The use of technological resources therefore provides new opportunities to refine strategic orientations and form of internationalization (Andersson et al., 2014; Knight and Liesch, 2016; Coviello et al., 2017; Kriz and Welch, 2018). By questioning this current of thought, scientific debates combining digital technologies and internationalization process of firms are emerging in the literature (Autio and Zander, 2016; Brouthers et al., 2016, 2018; Coviello et al., 2017; Hagsten and Kotnik, 2017; Strange and Zucchella, 2017; Hannibal and Knight, 2018; Kriz and Welch, 2018; Neubert, 2018; Ojala et al., 2018; Stallkamp and Schotter, 2018; Watson et al., 2018; Wittkop et al., 2018; Banalieva and Dhanaraj, 2019; Chen et al., 2019; Enjolras et al., 2019; Monaghan et al., 2019; Hult et al., 2020). However, existing studies have focused mainly on the internationalization patterns of technological firms, leaving slightly aside the effect of digital technologies on the global activities of established internationalizing MSMEs. In that regard, the thesis highlights the main research gap in the

literature that questions the role of digitalization in creating and exploiting opportunities in international trade (Knight and Liesch, 2016; Coviello et al., 2017; Kriz and Welch, 2018; Hult et al., 2020) and uses IE insights in order to find a way to link the use of digital technologies and the internationalization pattern of MSMEs.

1.2.2.1 International Entrepreneurship

Since the 1990s, the internationalization of small firms has become a widespread phenomenon that underscores the increasingly active role of MSMEs in international markets (Oviatt and McDougall, 1994; Lu and Beamish, 2001). While conventional theories considered small and young firms as mostly limited in resources and inexperienced in dealing with foreign markets (Brouthers et al., 2015), new interest emerged in scientific research on the growth of these entrepreneurial firms, aiming at rapid internationalization. Thus, in response to taking a sequential approach, several authors have actively investigated alternative internationalization models and perspective (Oviatt and McDougall, 1995; Coviello and McAuley, 1999; Gankema et al., 2000; Lu and Beamish, 2001; Nummela et al., 2006; Ruzzier et al., 2006; McAuley, 2010). At the nexus of IB and entrepreneurship theories, the emphasis on these small entrepreneurial firms in scientific research has given rise to the research streams of IE (McDougall and Oviatt, 2000; Keupp and Gassmann, 2009). The growing body of literature is notably interested in the widespread phenomenon enabled by technological advances and cultural awareness that has opened foreign markets to small entrepreneurial firms soon after their inception (Zahra and George, 2002; Oviatt and McDougall, 2005). Because these small firms seem more comfortable with the use of technologies and more innovative, researchers argued they can overcome several international barriers. Thus, despite their limited initial resources, they are actively engaged in foreign market businesses (Knight and Liesch, 2016). IE has been recognized as a major lever in the global economy and was initially associated with early internationalization of new ventures (INVs), identified and explained by Oviatt and McDougall (1994) as businesses "*that, from inception, [seek] to derive significant competitive advantage from the use of resources and the sale of outputs in multiple countries*". Consistent with this perspective, some authors also developed the popular concept of "born global" in order to describe the phenomenon of these small companies operating abroad early in their activities (Rennie, 1993; Knight and Cavusgil, 1996). Seen as entrepreneurial, scientists suggested these firms possess a global mindset to overcome entry barriers in foreign markets. Within the field of research, although one stream is primarily concerned with international new ventures (from inception), the other stream is focused mostly on the internationalization of established MSMEs (Lu and Beamish, 2001; Zahra and George, 2002; Jantunen et al., 2005; Zahra et al., 2005; Covin and Miller, 2014), the stream to which the thesis belongs. Over time, IE has grown significantly in terms of generating a wide range of scientific research. Although academic researchers have applied different definitions and perspectives of IE, a large number of contributions have been published over the last two decades. However, even the rich potential for further research and theory development, the field of research is suffering from theoretical paucity (Jones et al., 2011). Especially due to the lack of common conceptual framework, its theoretical foundations remain highly fragmented (Keupp and Gassmann, 2009). By lacking a unifying paradigm and clear, conceptual and methodological directions,

scientific research conducted on IE often used concepts from IB theories and entrepreneurship (Zahra and George, 2002; Keupp and Gassmann, 2009).

1.2.3 Entrepreneurial orientation

Initially, the construct of EO has been leveraged within the IE field (Covin and Miller, 2014). Before clarifying how IE applies the concept of EO, the research introduces its main theoretical foundations. In the literature, the concept of EO has garnered significant attention from researchers over the years. Mainly conceptualized as an organizational trend in decision-making that favors entrepreneurial initiatives (Lumpkin and Dess, 1996; Anderson et al., 2009), EO can be described as *the propensity to use new behaviors for anticipating and acting on future changes in the external environment, and the willingness to undertake investments with uncertain results* (Lumpkin and Dess, 1996). Following the increasingly competitive environment, firms are required to adapt their efforts in order to benefit from or preserve their market advantage (Covin and Slevin, 1989). To this end, as EO is a resource and capacity that provides the main capabilities for consolidating competitive edge (Covin and Slevin, 1989; Lumpkin and Dess, 1996), entrepreneurial firms would have to adopt such an orientation as a strategic posture (Covin and Slevin, 1989; Lumpkin and Dess, 1996; Anderson et al., 2009; Rauch et al., 2009). More particularly, EO can be represented as the entrepreneurial strategy-making processes that provide the basis to favor entrepreneurial decisions and actions, support firm's vision and create competitive edge (Rauch et al., 2009). Alongside the literature, it has been acknowledged that firms with a high level of EO perform better than other firms (Wiklund, 1999; Krauss et al., 2005; Anderson et al., 2009; Li et al., 2009; Rauch et al., 2009). The degree of EO can be identified through a continuum ranging from a more conservative posture to a more entrepreneurial one (Covin and Slevin, 1989; 1991). As Miller (1983) argued, an entrepreneurial firm *is one that engages in product-market innovation, undertakes somewhat risky ventures, and is first to come up with "proactive" innovations, beating competitors to the punch*. Based on these assumptions, the degree of entrepreneurship could be measured by the proclivity of a firm to value innovative, proactive and risk-taking actions (Miller, 1983). In that respect, EO is based on a unidimensional strategic orientation towards three components: *innovativeness*, which refers to the firm's predisposition and willingness to support new ideas and engage creativity and experimentation in the development of products and services – *proactiveness*, which represents the disposition of a firm to recognize and exploit opportunity in order to enhance competitive advantage and prevent need and change in the operating business environment – and *risk-taking*, which involves taking risks by committing substantial resources that have uncertain outcomes (Covin and Slevin, 1989; Lumpkin and Dess, 1996). In the literature, EO has been first conceptualized as a firm-level perspective (Covin and Slevin, 1991; Lumpkin and Dess, 1996; Wiklund, 1999; Li et al., 2009; Anderson et al., 2015), to which this thesis belongs. However, as numerous authors considered that there is no entrepreneurship without the entrepreneur, many researches have applied EO as an individual-level process by using a personal traits and behavioral approach (Krauss et al., 2005; Poon et al., 2006; Rauch et al., 2009; Khedhaouria et al., 2015).

1.2.3.1 IE and EO

Although EO was originally developed to describe entrepreneurial behaviors in a domestic context (Miller, 1983; Covin and Slevin, 1991), academic researchers have, over the years, found relevant associations to apply the concept of EO in an international context (Zahra and George, 2002; Jantunen et al., 2005; Brouthers et al., 2015). Consequently, because EO provides one of the key capabilities to build strong competitive advantage in markets (Lumpkin and Dess, 1996), the concept is often applied in the IE field (McDougall and Oviatt, 2000). More particularly, as EO is the ability to adopt new behaviors in order to manage future changes in the external environment and the propensity to engage in investments with uncertain returns (Covin and Slevin, 1989; Lumpkin and Dess, 1996), scientific research has suggested that EO capabilities would be notably useful to internationalizing MSMEs. As EO involves innovative, proactive and risk-taking efforts to better discover and exploit opportunities and outperform competitors (Miller, 1983), these capabilities would lead to more successful international operations (Brouthers et al., 2015). Thus, by using the phenomena typically related to EO, academic researchers firstly defined IE as "*a combination of innovative, proactive, and risk-seeking behavior that crosses national borders and is intended to create value in organizations*" (McDougall and Oviatt, 2000). The association between IE and EO fields gave birth to the construct, International Entrepreneurial Orientation (IEO). As acknowledged in the literature, IEO is a multi-dimensional concept that captures the propensity of entrepreneurs to be innovative and proactive and to take risks in an international context (Knight, 2001; Covin and Miller, 2014). It is mostly based on the assumption that EO provides the competences to make better use of firms' internal resources, to obtain and exploit resources from external sources more efficiently, and thus, to improve internationalization patterns (Brouthers et al., 2015; Jantunen et al., 2005).

1.2.3.2 IE and opportunities

Over the years, the definition of IE has evolved and thus broadened the scope of application to new research perspectives. As outlined by Oviatt and McDougall (2005), the combination of entrepreneurial behaviors (innovativeness, proactiveness and risk-taking) are not the only entrepreneurial dimensions related to IE. Entrepreneurship is *viewed as focusing on opportunities that may be bought and sold, or they may form the foundation of new organizations* (Oviatt and McDougall, 2005). Thus, given the recent emphasis on opportunity recognition in the broader field of entrepreneurship, prominent IE scholars suggested it was relevant to update the definition of IE and included the significant role of opportunity. In that respect, Zahra and George (2002) extended the entrepreneurship concept to the international context and defined IE as "*the process of creatively discovering and exploiting opportunities that lie outside a firm's domestic markets in pursuit of competitive advantage*". In their research, Oviatt and McDougall (2005) also introduced a new perspective of IE as "*the discovery, enactment, evaluation, and exploitation of opportunities – across national borders – to create future goods and services*". According to these well-cited definitions, entrepreneurial internationalization involves both new and young ventures as well as established firms. By taking into consideration opportunity recognition as a driver of internationalization, researchers have many further avenues to

develop IE domain. As conceptualized by Reuber et al. (2018), these opportunities *tend to refer to possibilities for cross-border profit-seeking behavior by firms that allow potential new market entries*. However, although the relevance of the opportunity has been widely established in IE, its meaning and roles remains underdeveloped (Reuber et al., 2018). In their study, Zahra and colleagues (2005) argued that some of these opportunities are located and discovered while others derive from the design and implementation of an idea by the entrepreneur. In that regard, the thesis aims to focus in more detail on the characteristics that define the entrepreneur and her/his role in shaping opportunities.

1.2.4 Self-concept traits

Following the context of rapid technological advances, many researchers in entrepreneurship have focused their interest on profiling the particular traits of entrepreneurs and their entrepreneurial actions (Schumpeter, 1934; Shane, 2000; Kor et al., 2007; Rauch and Frese, 2007; Gruber et al., 2012). Indeed, in a context of technological change, the central role of entrepreneurship has been widely acknowledged in the literature. Over time, technological change allowed firms to create new processes, models of organization, products and markets. However, in order to discover and exploit these opportunities, entrepreneurs are crucial in the process (Schumpeter, 1934). Before technological change leads to the process of entrepreneurial exploitation, individuals are responsible for recognizing the opportunity and defining how to use the new technologies (Shane, 2000). Their perceptions that shape entrepreneurial ideas about what the firm can accomplish or not with its technological resources are paramount in this process; it allows growth options pursued to be better understood and predicted by an entrepreneur (Kor et al., 2007; Gruber et al., 2012). In that regard, the technological change does not create obvious entrepreneurial opportunities that everyone can recognize (Shane, 2000). The discovery and exploitation of opportunities depends directly on the individual characteristics of the entrepreneurs (Schumpeter, 1934), like personal traits, prior knowledge, technology and managerial capabilities (Shane, 2000; Grégoire and Shepherd, 2012; Gruber et al., 2012). In psychological research, many authors have investigated these individual characteristics and have developed theories in which entrepreneurship reflects stable attributes that are not accessible to everyone (Shane, 2000). Entrepreneurs are self-motivated individuals and rely primarily on themselves to start a business and achieve their goals. As outlined by Shane (2000), personal attributes, such as the need for achievement, the willingness to take risks, self-efficacy and locus of control, are closely associated with entrepreneurial behaviors and lead some people to pursue entrepreneurship. EO is driven by and results from various entrepreneurial behavioral traits (Miller and Friesen, 1982). As the thesis is interested in the role of individual behaviors in shaping entrepreneurial opportunities provided by digital technologies, it investigates two of these human attributes; self-efficacy and locus of control. These individual motivation concepts have been broadly studied in academic literature and many authors have noticed their positive and significant influence on EO (Miller, 1983; Boyd and Vozikis, 1994; Mueller and Thomas, 2001; Forbes, 2005; Zhao et al., 2005; Poon et al., 2006; Rauch and Frese, 2007; Khedhaouria et al., 2015; McGee and Peterson, 2019).

1.2.4.1 Self-efficacy

In the domain of entrepreneurship, many authors have studied factors and their combination that influence one to become an entrepreneur, such as traits, background, experience, and disposition (Gist, 1987; Wood and Bandura, 1989; Boyd and Vozikis, 1994; Chen et al., 1998). Self-efficacy is part of these investigations and is considered an important determinant of human behavior (Bandura, 1986; Boyd and Vozikis, 1994; Ajzen, 2002; Zhao et al., 2005; McGee et al., 2009). It represents one's perceived capacity to perform successfully in a variety of roles and tasks related to entrepreneurship (Bandura, 1986). By way of explanation, self-efficacy is firstly defined as "*people's judgements of their capabilities to organize and execute courses of action required to attain designated types of performance*" (Bandura, 1986). Few years later, a revised perspective is suggested in the literature; "*beliefs in one's capabilities to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands*" (Wood and Bandura, 1989). Both definitions relied on individuals' beliefs in their ability to reach given results. However, self-efficacy must be distinguished from outcome expectations and from the skills one possesses; self-efficacy reflects what individuals believe they can attain with those skills (Wood and Bandura, 1989; Ajzen, 2002). It impacts on the development of skills, the expenditure of effort and the degree of perseverance to reach given results (Bandura, 1982; Gist, 1987). Self-belief of efficacy is considered a useful and dynamic approach that illustrates the evaluation and decision-making process required to engage in entrepreneurial behaviors (Boyd and Vozikis, 1994; Zhao et al., 2005). In scientific research, the efficacy belief system is addressed under two underlying concepts; general self-efficacy and entrepreneurial self-efficacy. The concept of general self-efficacy is applied in a broader context and refers to one's confidence to successfully reach attainments in various tasks and various situations, whereas, entrepreneurial self-efficacy is associated with one's belief to successfully meet the roles and tasks related with new-venture management (Boyd and Vozikis, 1994; Chen et al., 1998; Forbes, 2005; McGee et al., 2009; McGee and Peterson, 2019). As the thesis is mostly interested in established firms, it relies on the concept of general self-efficacy. This concept is also easier to measure in view of the variety of tasks and associated skills related to entrepreneurial activities (McGee et al., 2009; Khedhaouria et al., 2015; McGee and Peterson, 2019).

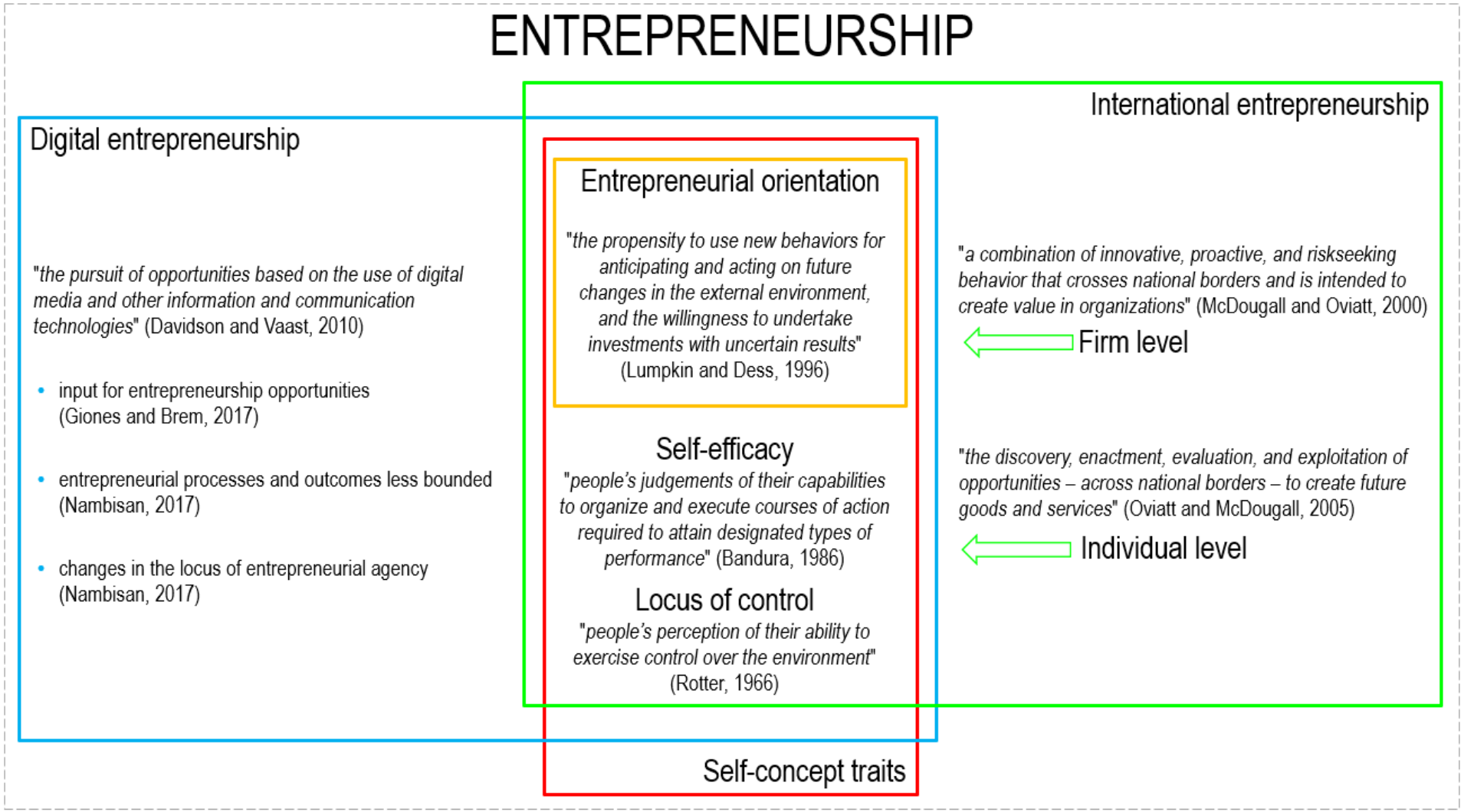
Because each individual cultivates her/his efficacy in different areas and levels, this motivational construct is based mostly on a large set of self-beliefs related to the specific domain of functioning rather than on a comprehensive trait (Bandura, 2006). Self-efficacy evolves gradually across experiences. Consequently, mastery experiences and repeated performance accomplishments are effective ways to acquire a strong sense of self-efficacy (Gist, 1987, Wood and Bandura, 1989). As a result, the more individuals believe in their ability to successfully achieve given attainments, the more they aim for ambitious goals and make a stronger commitment to achieving them (Wood and Bandura, 1989). As argued by Bandura (1986), in addition to affecting an individual's choice of activities, perceived self-efficacy affects the degree of perseverance to achieve those goals. It has an impact on the level of effort allocated to achieving them. Therefore, individuals are more attracted to and more successful in carrying out activities for which they perceive a high

degree of self-efficacy and thus, tend to avoid tasks for which they have a low degree of self-efficacy (Bandura, 1982; Wood and Bandura, 1989; Boyd et al., 1994; Chen et al., 1998; Forbes, 2005; McGee and Peterson, 2019). In the literature, some researchers have drawn a parallel between this belief-based personality variable and a firm's strategic posture. It has been acknowledged that the more individuals who believe in their capabilities to successfully reach attainments, the more they may be likely to adopt entrepreneurial behaviors to drive their firms (Chen et al., 1998; Zhao et al., 2005). In this respect, MSMEs driven by such entrepreneurs who adopt these entrepreneurial behaviors would be more inclined to adopt an EO. Therefore, entrepreneurs would be more willing to favor innovative ideas, creative process and experimentation to launch new products and services, to anticipate change, act proactively on their environment and to take bold actions (Poon et al., 2006; Khedhaouria et al., 2015; McGee and Peterson, 2019). Such entrepreneurial behaviors would lead the company to build and maintain strong competitive advantages in markets and especially in foreign markets.

1.2.4.2 Locus of control

The self-concept of locus of control is a major personal attribute closely associated with entrepreneurial values and behaviors (Mueller and Thomas, 2001). The concept emerged in the field of psychology research and was developed to measure perceived control and its impacts on human behavior (Rotter, 1966). In the field of entrepreneurship, although both concepts are cognitive and relating to control (Rotter, 1966; Ajzen, 2002), researchers distinguish the concept of self-efficacy from locus of control (Boyd et al., 1994; Chen et al., 1998). Self-efficacy is task- and situation-specific, whereas locus of control is more general and related to a variety of situations (Gist, 1987). By way of explanation, someone might demonstrate a high degree of locus of control in general and manifest a low degree of self-efficacy in achieving specific tasks at a specific level of expertise. Another reason to make a distinction between these concepts is because locus of control is not only about behavioral control; it also measures outcome control (Rotter, 1966; Ajzen, 2002). Thus, locus of control is concerned with belief about outcome contingencies, whether results are determined by one's own actions or by external factors, and not with perceived capability (Bandura, 2006). It refers to the disposition of an entrepreneur to perceive control and, consequently, represents a stable predictor of a small firm's performance (Boyd et al., 1994; Ajzen, 2002; Wijbenga and Witteloostuijn, 2007). Because Rotter (1966) assumed that behavior is learned through social interaction, the author developed his insights on the role of reinforcement in determining behavior; the outcome of an event can be perceived either as contingent upon an individual's own behavior and under her/his personal control and understanding, or as being dependent upon external factors beyond their control and understanding. As individuals may have different expectations regarding the internal or external control of the reinforcement, Rotter (1966) makes a clear distinction between internal locus of control – the perception that rewards depend on an individual's own behavior, and external locus of control – the perception that rewards depend on outside factors (Boyd et al., 1994; Boone et al., 1996). Someone with an internal locus of control would perceive that the reward is contingent upon their own behavior and thus would believe they can control what happens in their lives.

Figure 2 – Theoretical framework overview



While someone with an external locus of control tends to assume that most of the events in their lives are controlled and result from a chance occurrence, in the literature, authors often associated the locus of control personality trait with proactiveness and leadership and considered the internal locus of control as a prerequisite for action orientation (Boone et al., 1996; Mueller and Thomas, 2001). Entrepreneurial strategies are thus strongly dependent on the level of perceived control. Furthermore, it has been acknowledged that internal managers tend to demonstrate more transformational leadership and tend to be more task-oriented than external managers, who seem to be more emotion-oriented (Boone et al., 1996). In this respect, scientific research outlined strong analogies between entrepreneurial behaviors and an internal locus of control orientation. In their arguments, authors considered that individuals with a high level of perceived locus of control (internal) tend to demonstrate entrepreneurial behaviors and innovative strategies, whereas individuals with a low level of perceived locus of control (external) are more associated with conservative behavior and low-cost strategies (Boone et al., 1996; Mueller and Thomas, 2001; Poon et al., 2006; Wijbenga and Witteloostuijn, 2007). As was the case for self-efficacy, scientific researchers found analogies between locus of control and strategic posture of firms. With a strong internal locus of control, entrepreneurs would be more inclined to believe that they have control over their environment and, therefore, would be more willing to lead their firm with entrepreneurial behaviors. With such orientation, entrepreneurs may experiment new approaches, launch new innovative products and services, pursue new opportunities, anticipate changes and take risks (Miller, 1983; Mueller and Thomas, 2001; Poon et al., 2006).

1.3 RESEARCH FRAMEWORK

1.3.1 Research aim and scope

In light of the research problem and the theoretical framework, scholars in the field of entrepreneurship have several opportunities to delve deeper into the digital context. Indeed, DE is still a rather nascent field of research and most of the theories need to be developed and discussed to clarify perceptions and empirical knowledge. The research problem outlines the significant change triggered by digital technological advances in terms of international trade and entrepreneurship activities and highlights the current need to combine the three dimensions of interest; digitalization, internationalization and entrepreneurial behaviors. Within this context, the thesis proposes on the one hand, to study how digitalization affects internationalization of MSMEs. The research thus focuses on internationalization and digitalization theories analyzing how these topics have been addressed in the scientific literature. This objective is identified with the ambition to close the most urgent gaps in current literature (Andersson et al., 2014; Welch and Paavilainen Mäntymäki, 2014; Knight and Liesch, 2016; Welch et al., 2016; Coviello et al., 2017; Kriz and Welch, 2018; Hult et al., 2020). On the other hand, the thesis aims to study the impact of using digital technologies on the entrepreneurial behaviors of internationalizing MSMEs, both at the firm and at individual levels. First, at the firm level,

it focuses on empirically investigating how the use of digital technologies affects strategic orientation of internationalizing MSMEs which in turn affects their internationalization intensity. Second, at the individual level, the research empirically seeks to examine key dimensions of the internationalizing firm's digitalization and entrepreneurial behaviors of firms and individuals. The main objective of this part is to examine the role of individuals' behaviors in shaping the relationship between the use of digital technologies and the strategic posture of MSMEs. As a paper-based dissertation, the research attempts to contribute to the knowledge on entrepreneurship research and more particularly on DE and IE fields.

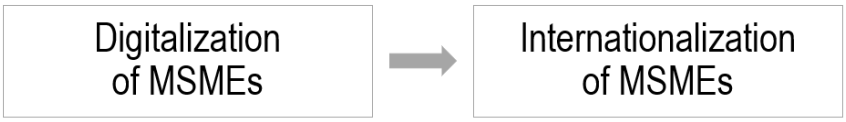
In the literature, scientific research still considers these two research streams separately. Thus, the thesis aims to draw a new perspective on the current theories. Following the importance of better adapting the theoretical impetus of IB research to realities on the ground (Delios, 2017), the overall goal of the study is to create knowledge which supports established MSMEs in achieving entrepreneurial and competitive digitalization and internationalization. It addresses the following overall research question; *How can MSMEs use digital technologies to achieve entrepreneurial and competitive international activities in a digital context?* To answer this governing question, the research combines insights from the literature in the fields of entrepreneurship digitalization and internationalization, as well as empirical data from a quantitative survey. In order to build a new look at traditional theories and to contribute to the nature of a thesis by published works, the research is organized through three sub-research questions, each of which resulted in a scientific paper. Table 2 introduces the sub-research questions and Figure 3 illustrates the overall research questions addressed in the research.

Table 2 – Sub-research questions

Sub-research questions	**Key dimensions**	**Methodology**
1. How does digitalization affect the internationalization of firms, and what entrepreneurial opportunities might offer the use of digital technologies in trading with foreign markets?	At the conceptual level	Literature review
2. How does the use of digital technologies impact the entrepreneurial behaviors of MSMEs, that in turn, enhances internationalization propensity of internationalizing MSMEs?	At the firm level	Quantitative study
3. What is the role of individuals' entrepreneurial behaviors in the relationship between the use of digital technologies and the entrepreneurial behaviors of internationalizing MSMEs?	At the individual level	

By linking insights from literature on internationalization and digitalization of firms, the first sub-questions seek to shed light on how the digital context is currently transforming activities of internationalization. It also intends to offer a better understanding of how the use of digital technologies can lead to new entrepreneurial opportunities for trading in foreign markets. From a conceptual point of view, the objective of the first part is grounded in the current need to develop new theoretical perspectives for research on internationalization on the interface of IB and entrepreneurship (Keupp and Gassmann, 2009). Nowadays, the digital context strongly impacts internationalization of firms in terms of accessibility

of resources, skills and competence acquisition, learning and knowledge-development in foreign markets, location and entry-mode choices as well as time and expansion rate (Autio and Zander, 2016; Coviello et al., 2017). However, internationalization theories and models have not been adequately adapted to the possibilities and challenges provided by the digital context (Andersson et al., 2014; Welch and Paavilainen Mäntymäki, 2014; Knight and Liesch, 2016; Welch et al., 2016; Coviello et al., 2017; Kriz and Welch, 2018; Hult et al., 2020). Because emerging technologies are transforming internationalization process, the research intends to incorporate the new digital reality into the current conception of internationalization theories. To this end, by reviewing the literature, the research highlights essential knowledge and research findings related to the fields of interest. It conducts an in-depth analysis of five papers of relevant scientific research and builds a synthesis of key insights that links digitalization with the internationalization of firms. Organized through four major dimensions related to the internationalization of firms – costs, accessibility, resources and competences; market knowledge; distance and localization; relational competences and partner networks – the synthesis outlines the main effects of digitalization on the internationalization of firms and introduces potential opportunities provided by the use of digital technologies. Furthermore, despite the burgeoning scholarly interest in the digital area in scientific research, a number of ontological questions still persist about digitalization and its clarity suffers from few semantic confusions. Answering these first sub-research questions is thus an opportunity to provide conceptual clarity to the digital context and to discuss its meaning in internationalization research.

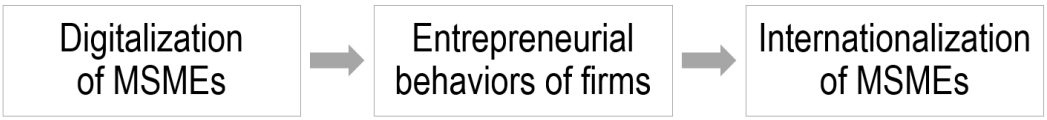


How does digitalization affect the internationalization of firms, and what entrepreneurial opportunities might offer the use of digital technologies in trading with foreign markets?

On the basis of a quantitative survey, the second and third sub-research questions aim to investigate in more detail the relationship between digitalization and the internationalization of MSMEs. Because the characteristics that define entrepreneurship have been closely associated within the research fields of digitalization and internationalization of firms, the thesis has focused on entrepreneurial behaviors in order to link the two research streams. Thus, it builds mainly on DE and IE. Based principally on the theoretical foundations of entrepreneurship, which involves recognizing, seizing and transforming opportunities into marketable goods or services to create new value, the fields of DE and IE have focused deeply on entrepreneurial behaviors. Whether studies have focused on the strategic characteristics of emerging technologies or on the principles of successful international activities, scientific research has taken into account entrepreneurial behaviors as a key element. By shaping spatial and temporal boundaries of entrepreneurial activities, digital technologies allow firms to overcome several issues related to strategic decisions. Consequently, emerging technologies are widely associated with entrepreneurship activities. Their use has rendered entrepreneurial processes and outcomes less bounded. It has also transformed firms' governance so that it becomes less centralized

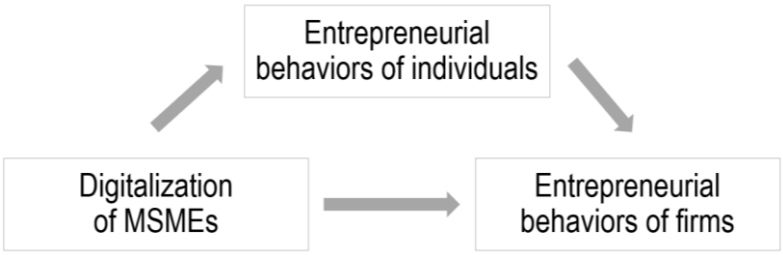
and more distributed among a diverse set of actors directly involved in entrepreneurial activities (Nambisan, 2017). Entrepreneurial activities are also essential in international trade and required a strong entrepreneurial behavior. In IE literature, the popular emergence of the role of entrepreneurial behaviors has been broadly investigated (Jones and Coviello, 2005; Brouthers et al., 2015). Researchers have closely linked entrepreneurial behaviors with a firm's propensity for internationalization. In this respect, the opportunities afforded by the use of digital technologies to strengthen entrepreneurial activities seems to be increasingly relevant to enhance entrepreneurial behaviors of internationalizing MSMEs.

In the literature, entrepreneurial behaviors are established at two levels. On the one hand, many studies shift their attention to entrepreneurial behaviors at the firm level (Covin and Slevin, 1991; Lumpkin and Dess, 1996; Wiklund, 1999; Li et al., 2009; Anderson et al., 2015). On the other hand, a number of authors argued that there is no entrepreneurship without the entrepreneur. These authors considered that it is therefore important to study entrepreneurial behaviors at the individual level (Schumpeter, 1934; Shane, 2000; Kor et al., 2007; Rauch and Frese, 2007; Gruber et al., 2012). Along the quantitative study, both levels - firm and individual - are applied to investigate how the use of digital technologies impact the entrepreneurial behaviors of internationalizing MSMEs. In order to answer the second sub-research question related to the firm level, the study incorporates the concept of EO into the relationship between the dimensions of digitalization and internationalization of MSMEs. As acknowledged in the literature review, the concept of EO refers to an orientation in decision-making that favors entrepreneurial activities (Covin and Slevin, 1991). At the outset, scientific researchers have closely associated the IE research field with EO. They have suggested that EO provides one of the key capabilities for building competitive advantage (Lumpkin and Dess, 1996). As digital technologies are shaping entrepreneurial activities, the focus of the second sub-research question is on gaining an understanding of how the use of digital technologies impacts entrepreneurial behaviors, that in turn, impacts the internationalization propensity of firms. The core aim of this second part is to bridge the gap that separates the use of digital technologies in shaping entrepreneurial activities and the internationalization of firms. On the basis of key variables, such as the degree of digitalization of internationalizing MSMEs (according to internal and external firms' dimensions), their EO (innovativeness, proactiveness and risk-taking) and their intensity of internationalization (operationalized to reflect the scale, scope, speed and mode), the study aims to test a conceptual process. The main contribution of this part is to consider the dimensions of digitalization, EO and internationalization as part of the same process. It aims to extend beyond conventional views that have investigated these dimensions separately.



How does the use of digital technologies impact the entrepreneurial behaviors of MSMEs, that in turn, enhances internationalization propensity of internationalizing MSMEs?

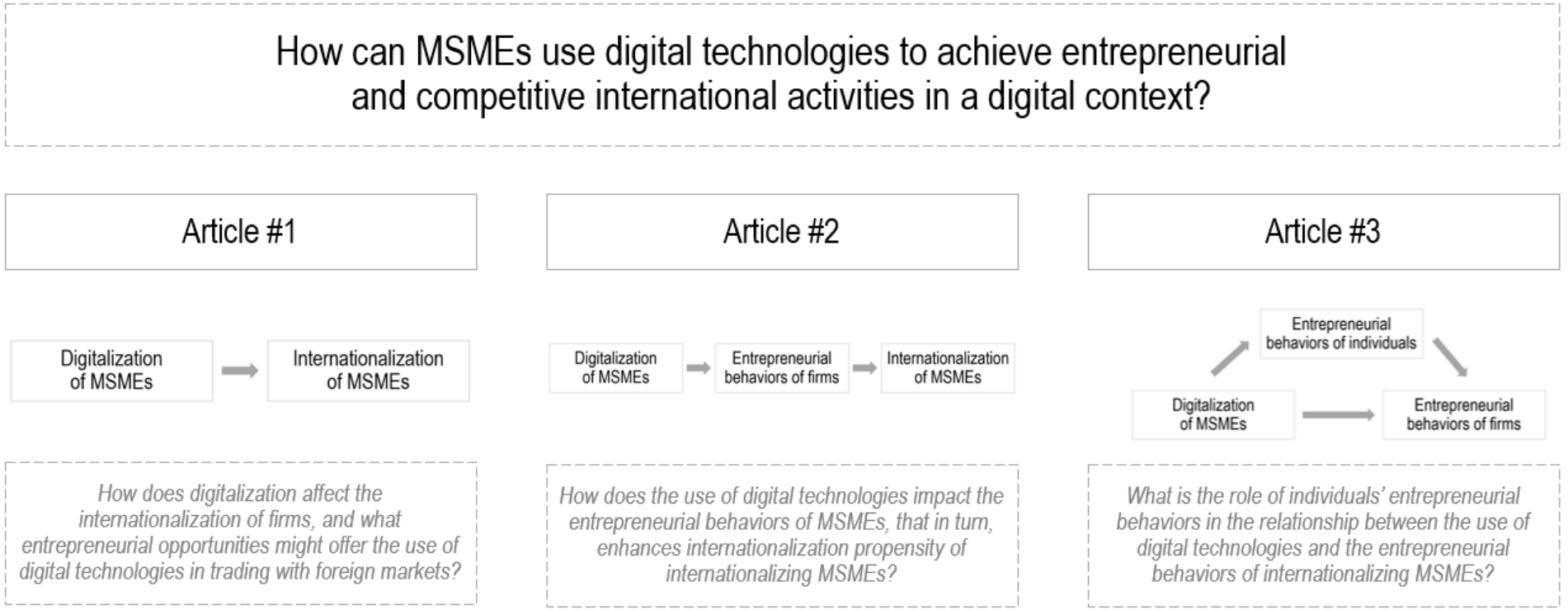
On the basis of the quantitative survey, the thesis answers the third sub-research question by focusing on the relationship between the use of digital technologies and the strategic posture of MSMEs and by paying more attention to the role of the individuals. Within the entrepreneurship domain, scientific research has been actively interested in profiling the entrepreneur behaviors and her/his entrepreneurial activities (Schumpeter, 1934; Shane, 2000; Kor et al., 2007; Rauch and Frese, 2007; Gruber et al., 2012). Because it is individual characteristics that influence the discovery and exploitation of opportunities, the entrepreneur has been acknowledged as a central driver to taking advantage of technological changes and defining competitive strategies (Schumpeter, 1934). In order to make effective use of technological resources, the individual perceptions that shape entrepreneurial behaviors of a firm are capital (Gruber et al., 2012). Thus, researchers currently need a more exhaustive representation of the individual who drives the recognition of opportunities into a digital context. On these assumptions, the third sub-research question aims to define the role that the entrepreneur may play in using digital technologies and shaping entrepreneurial behaviors of firms. In order to explore the individual role, the study includes two self-concept traits in the relationship between the digitalization and the EO of internationalizing MSMEs. The two self-concept traits, self-efficacy and locus of control, are operationalized to reflect the dimension of the entrepreneur. The main purpose of this last part is to develop and test a set of hypotheses in which self-efficacy and locus of control mediate the core relationship that links the degree of digitalization and EO of MSMEs.



What is the role of individuals' entrepreneurial behaviors in the relationship between the use of digital technologies and the entrepreneurial behaviors of internationalizing MSMEs?

Overall, the three sub-research questions are specifically addressed to cover the full scope of the main research question. First, by reflecting on the effect of the digital context on the firms' internationalization activities, the research provides conceptual clarities and insights into the main impacts and opportunities afforded by emerging technologies. The research then explores the impact of the use of digital technologies on the entrepreneurial behaviors of internationalizing MSMEs. Initially, the research focuses on the firm level by observing how the degree of digitalization of firms affects their strategic posture, which is crucial for increasing the intensity of internationalization. Finally, the research focuses on the individual and investigates the role of self-concept traits in the relationship between the use of digital technologies and the strategic posture of internationalizing MSMEs.

Figure 3 – Overall research questions



1.3.2 Epistemological approach

Research in the management field generally aims to describe, understand, explain or predict phenomena related to organizations. In other words, it aims to provide a variety of existing ideas and concepts that interact with the research problem. In developing the research project, several choices were considered to achieve the study objectives and answer the research questions. However, before developing the thesis approach, it was essential to define a research posture. Taking an epistemological posture in management research is significant in order to affirm the scientific identity of management sciences and also the epistemological identity of management knowledge. The epistemological approach of the study first oscillated between a constructivist and a positivist paradigm. Initially, the thesis planned to conduct a qualitative approach on the ground: in other words, to conduct a research-intervention. This approach is increasingly gaining ground in management science research. As it emphasizes the role of the problem arising in the field, this stream of thought is based on an interactive dynamic between the researcher and the field actors (Perez, 2008). In research-intervention, researchers need to immerse themselves in the field in order to develop and analyze the theoretical constructs resulting from the interactive research process. Defined according to the action and interventions of the actors through their cognitive processes, this approach is thus considered a constructivist perspective (Le Moigne, 1995). However, although research-intervention is appropriated to study a phenomenon, such as the digital context, this approach was not consistent with the overall research aim. In order to meet the purpose of the study, it was not sufficient to limit the observation to one or even two companies. In view of the novelty of the topic and its growing emergence in scientific research, it seemed more relevant to contribute an empirical data collection that involves a larger sample of companies. Indeed, research on the role of digitalization in the internationalization activities of MSMEs is still in its very beginning. Nowadays, the scientific communities interested in the debate lack statistical data to represent and explain the role of digital technologies in internationalization activities of firms. Moreover, the application of digital technologies and the goals pursued differ considerably from one firm to another. Hence, it was not sufficient to rely on a single case in order to collect data for the study. To address this issue, the study was subsequently oriented towards a quantitative survey. By relying on scientific evidence, the study has shifted to a deterministic vision, which is more interested in finding explanations of relationships between the research streams involved. Based on a series of hypotheses formulated, it has developed an explanatory model of the facts observed. The research thus moves towards a positivist paradigm. The main goal of positivist investigation is to set up explanatory associations or causal relationships to better predict and control the phenomena studied (Bryman, 1984). Positivist researchers tend to observe events from the outside and from the stand point of a cluster of empirical evidence (Bryman, 1984). Contrary to the constructivist paradigm, researchers who adopt a positivist approach operate in dualism and objectivity (Park et al., 2020). As the aim of positivist research is an objective interpretation of facts, knowledge is developed objectively without the interaction of researchers. Consequently, researchers are not personally involved in the study. There is a complete separation between the research participant and the researcher in order to reduce bias in the study. To facilitate the

research process, a positivist paradigm is aligned with the hypothetico-deductive model of science (Park et al., 2020). In other words, by taking a theory-verification approach, positivist research relies on the hypothetico-deductive method to verify hypotheses. It is a circular process; hypotheses are first built from the literature and are tested though operationalizing variables. Findings from the empirical study are then used to contribute to the literature and refine theory (Park et al., 2020).

1.3.3 Research methodology

The intention of the thesis is first to shed light on the effects and opportunities associated with the digital context and the internationalization of firms and, second, to study the impact of using digital technologies on the entrepreneurial behaviors of internationalizing MSMEs. In order to encompass the specific aim of the research and the sub-research questions, the formulation of a suitable methodology framework was essential. Due to the lack of empirical evidence that associates the thesis' fields of interest, two methodological approaches were adopted; a conceptual and a quantitative approach. The purpose of combining two approaches is to obtain valuable insights from existing research and to increase the breadth of the literature with statistical evidence. Figure 4 illustrates the methodological framework adopted for the overall research.

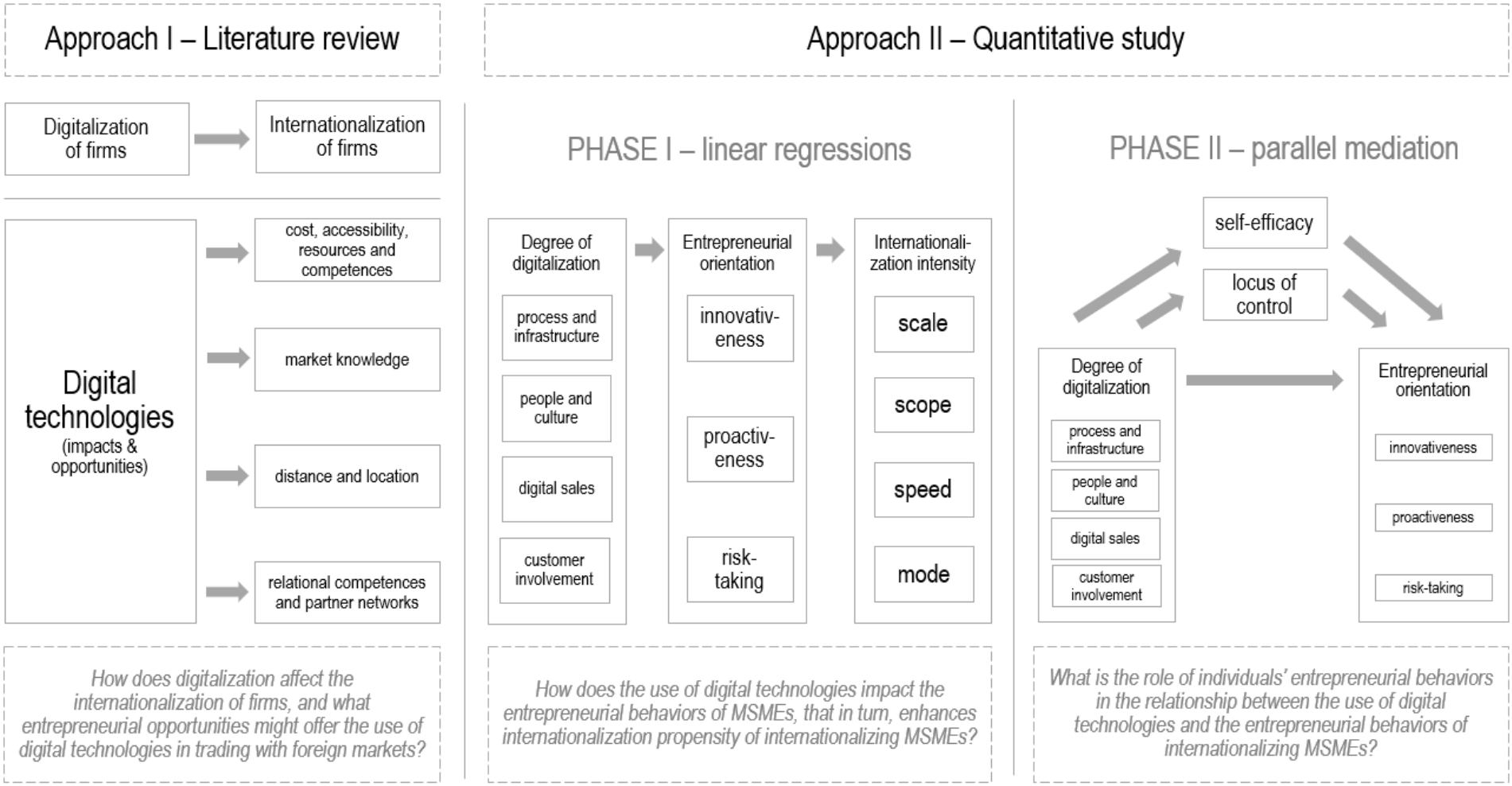
1.3.3.1 Literature review

The first part of the research consists of a literature review. A literature review is a comprehensive synthesis of past research. It can be described as a way of collecting the literature on a particular topic and synthesizing previous scientific research (Snyder, 2019). Although researchers have several goals when writing a literature review, the most ambitious one involves theory development (Baumeister and Leary, 1997). In other words, literature reviews can be viewed as a basis for establishing new theoretical insights or conceptual models. Furthermore, it can outline an overview of an assortment of articles on the topic or even draw the evolution of a particular research field over time. By reviewing the literature, researchers summarize essential knowledge and research findings to a specific scientific field. In line with these major points, the study conducts an in-depth analysis of the literature in order to build a synthesis of key insights that links digitalization with internationalization theories. The main goal of the review is to comprehensively present the relevant literature that has studied the impact of the use of digital technologies on the internationalization process of firms.

Data collection and analysis

In order to perform the literature review, the research selects relevant scientific papers that have specifically addressed how digitalization is impacting and transforming the internationalization process of firms. When collecting the data, it was found that very few articles have investigated the fields of interest and only few of them addressed digitalization by considering purely digital technologies.

Figure 4 – Methodological approaches



The novelty of the field can explain the lack of scientific research on digitalization and internationalization of firms. The limited number of articles meeting the search criteria prevents the study from taking a systematic approach. On the contrary, it led the study to a more traditional review. The identification of relevant papers is conducted according to the following search criteria; peer-reviewed and conference papers, publication between 2016-2018, in English, addressing digitalization in a context of purely digital technologies. The search starts with the two main terms, "internationalization" and "digitalization". Because the first search resulted in only a very small number of results, the review approach involves the search for a higher number of potentially relevant terms around the two fields of interest. It thus expands to a broader set of keywords: "internationalization theory", "international entrepreneurship", "digital internationalization", "digital technologies", "digital entrepreneurship" and "digital transformation". To be considered relevant, scientific papers must contain information about the effects of digital technologies on the internationalization process of firms. After completing the search for data, the study selects the main relevant articles (11) and conducts an in-depth analysis and comparison of these articles. Results of the in-depth analysis highlight the five most suitable papers (5). Because the five articles selected offer more systematic reviews and incorporate the majority of the key points found in other articles analyzed, they were used to elaborate the synthesis and answer the first sub-research questions. In addition, as their findings complement each other, these five papers provide consistent insights. In order to elaborate the synthesis, each paper is reviewed at an aggregate level to determine general directions. The main findings are then categorized into four main fields of activities that are at the center of interest in the internationalization process of MSMEs. These dimensions are also the main topics addressed in scientific research regarding the internationalization process of firms; costs, accessibility, resources and competences - market knowledge - distance and localization - relational competences and partner networks. The same structure is used to elaborate the synthesis. Results are also presented in a table organized around these four dimensions (see Table 3 in the appendix of article #1).

1.3.3.2 Quantitative study

The quantitative study aims to demonstrate statistically how the digital context (considered, in that case, the use of digital technologies), influences the entrepreneurial behaviors of MSMEs, which is particularly crucial for global trade with foreign markets. By focusing on the entrepreneurial behaviors of firms, the study draws on two different phases as part of the quantitative study. Each phase resulted in a scientific paper. The first phase occurs at the firm level and aims to test a conceptual process that links the dimensions of digitalization, EO and internationalization as part of the same process. The second phase occurs at the individual level and intends to investigate the mediating role of self-concept traits on the relationship between digitalization and EO of internationalizing MSMEs.

Sample and data collection

In order to address the second and third sub-research questions and gather empirical data, the study relies on a quantitative research design. Data were collected on a sample of internationalizing Swiss MSMEs. Switzerland is a

good representative, not only with regard to MSMEs but also internationalization and digitalization. First, the country has over 99% of MSMEs: that means firms with fewer than 250 collaborators. As they account for more than two thirds (67,6%) of total business employment (FSO, 2019), MSMEs play a major role in the Swiss economy. Second, given the cultural and language diversity of the country, as well as its strong investment in international trade, Swiss MSMEs are greatly active in foreign markets. In that regard, it has been reported that of the 586,214 companies registered in Switzerland, 9% (50,589) exported goods worth CHF 298 billion (FCA, 2019). In total, this represents around 40,000 MSMEs, which accounted for 45% of all Swiss exports (FCA, 2019). In a small economy like Switzerland's, it seems obvious that globalization is a good strategic option for MSMEs. Third, Switzerland benefits from an in-depth mastery of technology. Although its territory is poor in natural resources, the country has a strong advantage in terms of technologies that enable it to make favorable use of advances in digitalization (GDS, 2018). Highly competitive in basic and innovative technologies as well as internationally, Switzerland is a particularly diversified entrepreneurial universe that is responsive to changes related to technological advances. It thus represents an interesting setting for the thesis.

Data were ordered from the business data provider, Bisnode D&B Ltd. As a first step, data on each MSME were classified according to their different cultural, linguistic, and economic regions of Switzerland. In a second step, 8,000 Swiss MSMEs were randomly selected and included in the study – hence, almost 20% of all exporting MSMEs based in Switzerland. The survey was addressed to the CEO of each of the MSMEs selected. As the questions specifically required high-level insights, it was almost impossible to delegate responses to a lower level. In order to analyze the data and ensure homogeneity in the sample, data collected were filtered. As the survey sample was to be made up exclusively of MSMEs that were active internationally, firms reporting more than 250 employees and generating less than 5% of their revenue in foreign markets were excluded from the sample. Finally, responses with missing data and contradictory answers were removed from the sample, resulting in a total sample of 190 internationalizing MSMEs. On average, MSMEs employ 60 employees and generate 55% of their total revenue in foreign markets. In the overall sample, the categories of MSMEs are distributed as follows; 27 micro-enterprises (0-9 collaborators), 75 small enterprises (10-49 collaborators) and 88 medium enterprises (50-250 collaborators). Regarding the represented industries, one half of the MSMEs are in manufacturing industries and the other half is distributed among companies active in logistics, professional services, personal and consumer services, IT and communications, heath, as well as wholesale and retail businesses. MSMEs in the sample can look back on more than 30 years of international activities and serve close to 20 countries on more than three continents. These firms are managed mainly by men (95%) with an average age of 40 years. Table 3 summarizes the sample demographics.

Table 3 – Sample demographics

	Sample		Mean	
Firm level	Size of firm (number of collaborators)		60.68	
	Age of firm		45.24	
	Internationalization intensity	• Scale	55.47	
		• Scope	19.90	
		• Speed	3.68	
		• Mode	1.95	
	Degree of digitalization	• Process and infrastructures	2.35	Overall degree 2.15
		• People and culture	2.43	
		• Digital sales	1.64	
		• Customer involvement	1.92	
	Entrepreneurial orientation	• Innovativeness	4.27	Overall degree 4.33
		• Proactiveness	4.51	
		• Risk-taking	4.28	
Individual level	Age of entrepreneur		40.87	
	Seniority of entrepreneur		13.50	
	Self-efficacy		5.53	
	Locus of control		5.63	

Measures

From the database, the thesis relies on five main measurements validated from existing literature – three variables at the firm level and two variables at the individual level.

Internationalization intensity – used in the first phase of the quantitative study, the intensity of internationalization of firms can be assessed along various dimensions. In order to measure the propensity of the MSMEs surveyed, the study focused on four dimensions that are highly relevant and significant if the intention is to seek a coherent perspective of the internationalization of MSMEs. These dimensions consist of the scale, the scope, the speed and the mode of internationalization. The scale indicator refers to the percentage of sales derived from foreign market activities to total firm sales revenue (Oviatt and McDougall, 1994; Zahra and George, 2002; Knight and Cavusgil, 2004; Kuivalainen et al., 2007). The scope represents the number of geographical markets with which MSMEs are involved and have generated revenue (Zahra and George, 2002; Jones and Coviello, 2005; Kuivalainen et al., 2007; Andersson et al., 2014). The speed is based on the current ratio of foreign sales to total sales in relation to the number of years involved abroad (Jones and Coviello, 2005; Oviatt and McDougall, 2005; Kuivalainen et al., 2007; Andersson et al., 2014; Ziyae et al., 2014). The mode refers to the combination of entry strategy applied by the MSMEs surveyed. In the literature, numerous alternatives of entry mode have been addressed (Datta et al., 2002; Malhotra et al., 2003; Jones and

Coviello, 2005; Brouthers and Hennart, 2007; Hashai et al., 2010; Andersson et al., 2014). Based on the major ones, the study selects a wide range of alternatives, including direct exports – indirect exports – e-commerce – licensing and franchising – joint ventures – subsidiaries.

Degree of digitalization – as part of a digital transformation, firms apply digital technologies at different degrees in different strategic pillars. Used in the first and second phases of the quantitative study, the variable degree of digitalization is based on a four-item scale related to various strategic pillars of firms including two internal pillars – process and infrastructure as well as people and culture, and two external pillars – digital sales and customer involvement (Greif et al., 2017). The variable consists of a self-evaluation that measures as comprehensively as possible each pillar of transformation. On the basis of four statements that describe the degree of digitalization, firms are asked to position themselves and to scale each strategic pillar on a range of 1 to 4. The results are interpreted as follows; the higher the score of the selected descriptive statement, the greater the degree of digitalization of the MSMEs surveyed.

Entrepreneurial orientation – in order to assess the EO of MSMEs used in the second and third phases of the quantitative study, the study relies on the questionnaire developed by Colvin and Slevin (1989). Based on three unidimensional strategic orientations that encompass the entrepreneur's behaviors, the variable consists of nine items consolidated under these three strategic orientations. The first three items are related to the firm's innovativeness, the second three assess their proactive behavior and the last three represent their propensity to undertake risky actions. Each item related to the unidimensional strategic orientations is measured according to pairs of opposite statements. The respondents are thus asked to indicate to which extent each item reflects their strategic posture, using a seven-point Likert scale type. The results are interpreted as follows; the higher the overall score, the more firms manifest entrepreneurial behaviors in their strategic orientation (Covin and Slevin, 1989; Lumpkin and Dess, 1996; Covin and Wales, 2012).

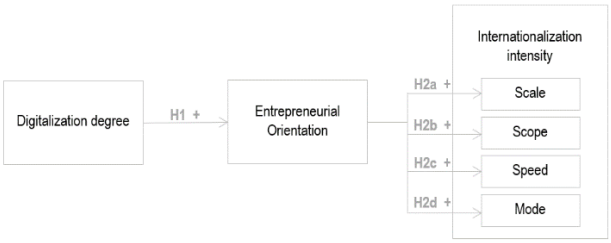
Self-efficacy – used in the second phase of the quantitative study, the variable of self-efficacy is measured at the individual-level. It consists of various items related to personal position in relation to various skills and competences associated with the topic in question. Thus, self-efficacy has to be tailored according to the specific domain related to the object of interest (Bandura, 2006). The study based its measurement on a conceptual framework of task requirements (Chen et al., 1998; Zhao et al., 2005). By applying a seven-point Likert scale, entrepreneurs are asked to assess how confident they are in successfully *identifying new business opportunities, creating new products and services, managing innovation within a business, being a leader and communicator, building up a professional network, commercializing a new idea or development and successfully managing a business*. The results are interpreted as follows; the higher the overall score, the higher the respondent's beliefs in her/his ability to successfully generate given attainments.

Locus of control – used in the second phase of the quantitative study, the variable of locus of control is the second belief-based personality variable that represents individual-level. The variable is measured according to the Levenson's (1974) scale, which is an adaptation and refinement of the original construct I-E scale developed by Rotter (1966). The study uses the internal control dimension that reflects entrepreneurial behaviors of decision-makers in particular. As was the case for EO and self-efficacy, items were written in Likert format, using a seven-point response scale (Sapp and Harrod, 1993). The results are interpreted as follows; the higher the score, the higher the respondent's belief that outcome contingencies are determined by her/his own actions.

Testing hypothesis

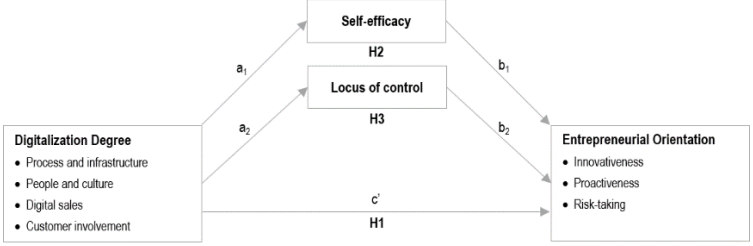
In the first phase of the quantitative study, the study relies on regression analysis to test hypotheses and evaluates the relationships between the variables. It investigates, on one hand, the relationship between the digitalization degree and EO of MSMEs and, on the other hand, the relationship between EO and the internationalization intensity of MSMEs.

Figure 5 – Research model of the first phase of quantitative study



In the second phase of the quantitative study, the research relies on parallel mediation to test hypotheses and measures the role that self-concept traits may play in the relationship between the digitalization and EO of MSMEs. Parallel mediation is a more complex model than traditional mediation analysis that incorporates more than one mediator to test the relationship between the independent and dependent variables (Hayes, 2013). In such analysis, empirical study has to follow a three-step approach (Baron and Kenny, 1986); (1) there is a significant relationship between the independent variable and the mediating variable, (2) there is a significant relationship between the independent variable and the dependent variable without including the mediator, and (3) by incorporating the mediator, the relationship between the independent and the dependent variables is reduced and the relationship between the mediator and the dependent variable is significant. In order to test the parallel mediated relationship between the variables in question, a series of regression analysis is estimated.

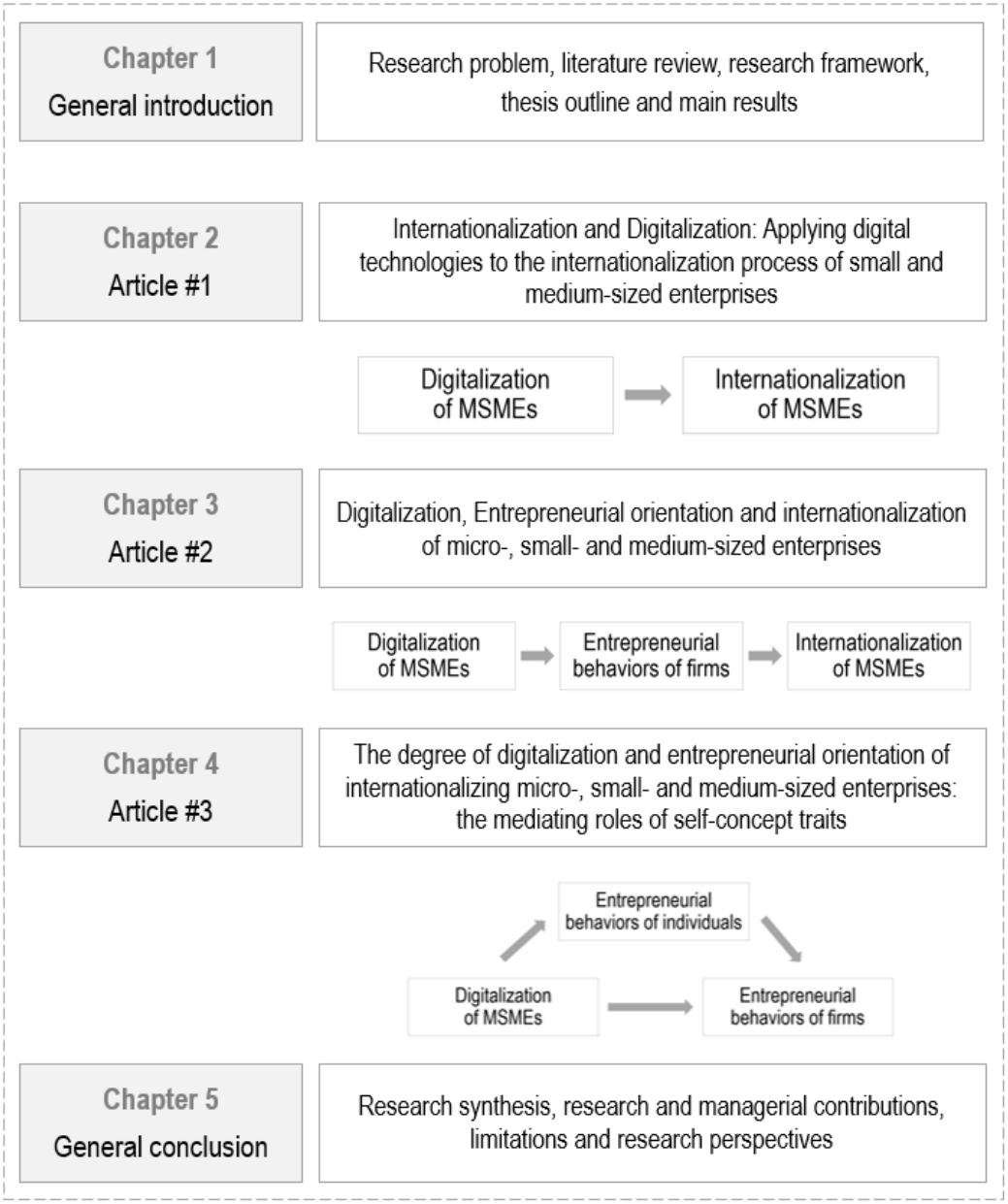
Figure 6 – Research model of the second phase of quantitative study



1.4 THESIS OUTLINE AND MAIN RESULTS

In order to adhere to the nature of a paper-based dissertation, each sub-research question previously introduced in the research framework chapter is answered through self-standing scientific papers. These scientific papers are reproduced in detail in the subsequent chapters (2-3-4). Following the logic of a thesis by published works, the overall thesis is structured into five main parts; general introduction – first scientific paper – second scientific paper – third scientific paper – general conclusion.

Figure 7 – Overall thesis structure



Each scientific paper follows the sequence of the sub-research questions and intends to provide new empirical insights to answer the governing research question. In brief, the first paper investigates the effects and opportunities of digitalization on the internationalization process of firms – the second article tests a conceptual process that

incorporates the entrepreneurial behaviors of MSMEs between the digitalization and internationalization dimensions – and the third paper questions the role of individuals in the relationship among the digitalization and entrepreneurial orientation of internationalizing MSMEs. Table 4 presents an overview of the scientific papers and matches the following elements: sub-research question, research design, key findings, publication outlet and status. The following subsection aims to provide a brief outline of the research and thus introduces the linkage of each paper according to their respective objective and main results. The synthesis of the results will be discussed in more detail in the concluding section.

1.4.1 Article #1

The first scientific paper aims to answer the question; "*How does digitalization affect the internationalization of firms, and what entrepreneurial opportunities might offer the use of digital technologies in trading with foreign markets?*". As mentioned in the research framework, the main objectives of the first paper are, on the one hand, to shed light on how digitalization is impacting the internationalization process of firms. On other hand, it strives to bring out how the use of digital technologies can lead firms to discover and exploit new opportunities in internationalization activities. The purpose is to provide a synthesis of key insights that outlines the main impacts of digitalization and the potential opportunities allowed by the use of digital technologies. To this end, the scientific paper relies on a literature review and is based on an in-depth analysis of five relevant scientific papers. The synthesis is designed through four main fields of activities related to the internationalization of firms. First, in terms of costs, accessibility, resources and competences, results highlight that digitalization helps firms in countering liabilities of foreignness (Brouthers et al., 2016, 2018; Coviello et al., 2017). Because distribution and production channels are dematerialized, transaction costs in foreign markets decreased. Furthermore, the use of digital technologies reduces the assets and location specificity (Autio and Zander, 2016). Other main effects of digitalization are the improvement of communication and interaction, the reduction of customers' acquisition costs, the possibility to manage internationalization activities remotely, time-saving in transactions, the optimization of decision-making processes, the acquisition of specific resources and competences, as well as the allocation of resources in several markets. Finally, the main opportunities that can be exploited by using digital technologies are; generating alternative revenues thanks to the use of digital platforms and infrastructure – targeting new niche markets – sharing skills, open innovation, co-creation and partnering with other firms – using digital technologies to reduce production costs – developing local markets – investing in qualified human capital. Second, in terms of market knowledge, the main impact of digitalization is the ability to capture, disseminate and process numerous data (Witten et al., 2016; Neubert, 2018). By having access to a large database, it provides firms with new fundamental experiential knowledge to better adapt their offers. It also reduces cross-border information asymmetry (Autio and Zander, 2016). By processing these data with predictive algorithms, firms can assess their current conditions and future market attractiveness (Neubert, 2018). They can also use advanced data-mining technologies to improve the decision-making process and strategic posture. Furthermore, as user-community platforms and social networks are flourishing,

it allows firms to directly interact with customers (Brouthers et al., 2016, 2018; Coviello et al., 2017). Thus, because firms are more familiar with customers' needs, numerous opportunities can be exploited. For instance, they can personalize products and services – conduct market experiments faster and more often – use feedback and comments to better meet end-user requirements – anticipate and target marketing efforts – and optimize speed and marketing gains (Autio and Zander, 2016; Brouthers et al., 2016, 2018; Strange and Zucchella, 2017). Third, in terms of distance and location, as borders are dematerialized, the main impacts of digitalization are the acceleration of operations, the reduction of psychological distance, the democratization of consumption on global scale and the multiplication of targeted countries. By transforming manufacturing production, the use of digital technologies encourages firms to base their decisions on proximity with customers rather than production costs (Strange and Zucchella, 2017). Furthermore, it provides more transferability of firm-specific assets (Autio and Zander, 2016) and allows firms to be less dependent on location-bound assets (Coviello et al., 2017). Digitalization might also have a positive effect on the liabilities of outsidership (*firm can be considered an outsider when reaching a new foreign market because they lack network relations*) (Brouthers et al., 2016, 2018). Firms can counter this liability by developing networks of users and large communities of users via digital platforms. However, to be impactful, they are required to reach a critical mass of users in a short period of time (Brouthers et al., 2016, 2018). Other accessible opportunities are in reaching new markets with the same resources – externalizing location-specific assets – partnering with local companies – licensing products and services to local firms as well as sharing production and distribution sites (Autio and Zander, 2016; Brouthers et al., 2016, 2018; Coviello et al., 2017; Neubert, 2017). Fourth, in terms of relational competences and partner networks, digitalization has increased market participants acting as sellers and buyers on both sides (Coviello et al., 2017). The use of digital technologies also provides firms with new opportunities to involve customers in their activities (Autio and Zander, 2016; Coviello et al., 2017; Strange and Zucchella, 2017). In addition, digitalization renders markets momentaneous and dedicated to specific transactions. Given the instantaneity in interactions afforded by the use of digital technologies, the pace of transactions is accelerated and allows companies to speed up their market adjustment to enter into several foreign markets at once (Coviello et al., 2017). Another impact of digitalization is the development of one large virtual global market that led to a broadening market scope and better access to local market actors and partners (Coviello et al., 2017). With the increasing flow of data, firms are more oriented toward digital exchanges than production (Coviello et al., 2017). It allows them to reach local knowledge and increase reliability in their relationships. Furthermore, by sharing data and competences with partners, firms have new opportunities to access targeted networks. The main opportunities afforded by the use of digital technologies are to multiply user communities in several countries – to collaborate with opinion leaders and change agents in foreign markets through social networks and user communities – to build online reputation (Brouthers et al., 2016, 2018; Coviello et al., 2017).

1.4.2 Article #2

The second scientific paper aims to answer the question; "*How does the use of digital technologies impact the entrepreneurial behaviors of MSMEs, that in turn, enhances internationalization propensity of internationalizing MSMEs?*". After revealing the main insights in the literature that outline the impacts and opportunities of digitalization in a context of internationalization, the thesis suggests investigating entrepreneurial behaviors of firms. As the first paper outlines the significant role of strategic posture in such a context, the purpose of the second study is to use the EO of firms in order to associate the dimensions of digitalization and internationalization. To this end, the study theorizes that the more MSMEs have digitalized internal and external functions of their organization, the more they favor entrepreneurial behaviors when leading strategic decisions. Thus, with greater EO, MSMEs will adopt new strategies and perform better in global markets by increasing their internationalization intensity (Jantunen et al., 2005; Covin and Miller, 2014; Brouthers et al., 2015). Because EO provides firms with skills to make better use of their resources and exploit new ones, they possess the capabilities required to launch innovative offers, identify and anticipate market needs and undertake risky actions in foreign markets (Jantunen et al., 2005; Covin and Miller, 2014; Brouthers et al., 2015). Built on empirical data, the second paper tests a conceptual process that links the use of digital technologies and the internationalization propensity of MSMEs. In two-fold steps, the study (1) investigates how the degree of digitalization of MSMEs effects their EO, (2) examines how the EO of MSMEs effects their internationalization intensity. Regarding the degree of digitalization, the results show that MSMEs are still mainly focused on transforming internal processes and training staff and are less willing to emphasize customer experience and involvement, which involve a more radical departure than adapting existing processes. On average, firms demonstrate a solid EO and are strongly active on the international stage. By elaborating on the results of the first hypothesis testing, the study finds a positive and significant relationship between the degree of digitalization and EO of MSMEs. More specifically, EO is affected mainly by the digitalization of internal pillars. Consequently, by decomposing EO dimensions, the study outlines positive and significant relationships among each component of EO (innovativeness, proactiveness and risk-taking) and the degree of digitalization of process and infrastructure, as well as the degree of digitalization of people and culture. Subsequently, the results of the second hypothesis testing exhibit a positive and significant relationship between proactiveness of MSMEs and scope of internationalization. Results also reveal a positive and significant relationship among risk-taking and speed of internationalization. However, findings emphasize that none of the EO components are a driver of scale and mode of internationalization. Moreover, the study does not find any relationship between the variables of internationalization and the innovativeness of MSMEs. In summary, the second paper statistically demonstrates that when firms use digital technologies, it has a positive impact on their level of EO which, in turn, contributes positively to increasing the scope and speed of internationalization of MSMEs.

1.4.3 Article #3

The third scientific paper aims to answer the question; "*What is the role of individuals' entrepreneurial behaviors in the relationship between the use of digital technologies and the entrepreneurial behaviors of internationalizing MSMEs?*". As disclosed previously, the thesis aims to investigate entrepreneurial behaviors in order to link the dimensions of digitalization and internationalization. Consequently, while the second paper examines the entrepreneurial behaviors of firms through EO, the third one considers the role of entrepreneurial behaviors of individuals as a lever of influence to operationalize the orientation of strategic decisions (Miller and Friesen, 1982; Covin and Slevin, 1991). As acknowledged in scientific literature, it is individual behaviors that leverage the discovery and exploitation of opportunities to take advantage of technological changes and define competitive strategies (Schumpeter, 1934). In this respect, the perceptions of individuals that shape entrepreneurial behaviors about what the firm can or cannot achieve with its technological resources are paramount to better explaining and predicting the growth options pursued by an entrepreneur (Gruber et al., 2012). The third paper arises from these assumptions and seeks to provide a more exhaustive representation of the individual who drives opportunity recognition in a digital context. In other words, it posits that the use of digital technologies in internal and external pillars of firms will reinforce the EO of internationalizing MSMEs and that individual behaviors are a central driver in this strategic approach. Built on the conceptual process developed in the second paper, the study incorporates two major self-concept traits associated with individual behaviors into the analyses. It designs a model of parallel mediation that tests the role of self-efficacy – operationalized to reflect individuals' beliefs in their capabilities to generate given attainments – and locus of control – operationalized to reflect the individuals' ability to exercise control over the environment – in the relationship among the key dimensions of digitalization and EO of internationalizing MSMEs. By way of explanation, the last paper develops a model linking the four pillars of digitalization to the three EO dimensions and measures how the relationship transits through the self-concept traits involved. First, as tested in the second paper, results indicate that the degree of digitalization is positively and significantly related to the EO of internationalizing MSMEs. It thus validates the first hypothesis. Second, findings demonstrate that the degree of digitalization positively and significantly affects self-efficacy, which in turn is positively and significantly linked to EO. Third, although results exhibit a positive and significant relationship between the degree of digitalization and locus of control, no direct effect is found between locus of control and EO. Thus, locus of control plays no mediating role in the relationship investigated. Finally, as the regression coefficient between the dimensions of digitalization and EO decreases when the mediators are added to the equation, findings of the parallel mediation model outline a partial mediating effect that transits through self-efficacy (MacKinnon et al., 2007; Hayes, 2013). These results validate the second hypothesis and reject the third one. By providing empirical evidence of the mediating role of individual behaviors, results emphasize that self-efficacy can be a way forward to strategically use digital technologies in order to reinforce EO of internationalizing MSMEs.

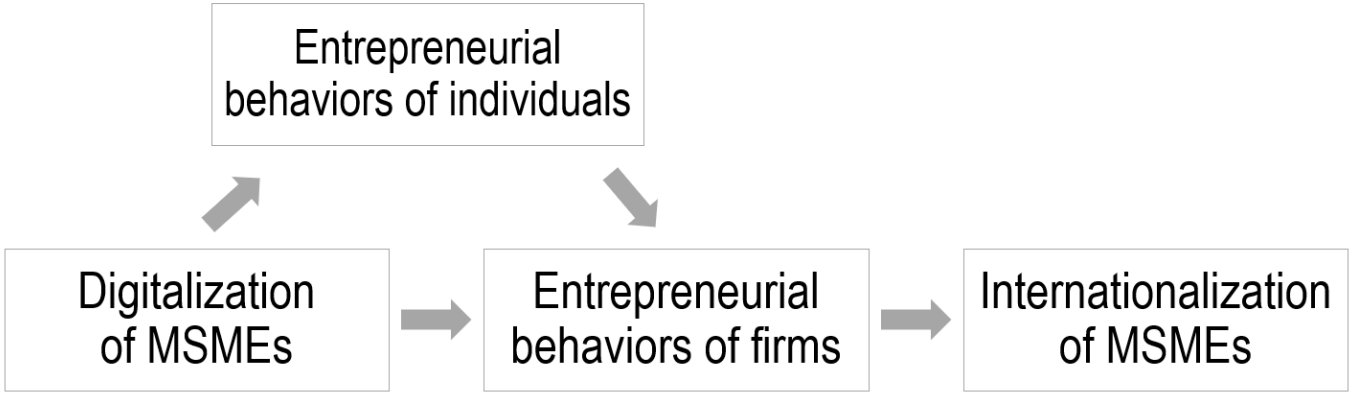
Table 4 – Overview of scientific papers

Sub-research question	Title	Research design	Key findings	Publication outset and status
1	Internationalization and Digitalization: Applying digital technologies to the internationalization process of small and medium-sized enterprises	Literature review	Results highlight the dynamic of a current international environment constantly in movement: • MSMEs are immediately connected on a global scale without necessarily requiring specific resources or reaching business networks and are threatening large companies by sharing their skills via large groups of entrepreneurs • transaction costs are significantly reduced • communication, distribution and production channels are dematerialized • markets are virtual, instantaneous and more competitive • physical flows are giving way to data flows • geographical distances are virtually reduced and allow partner networks to largely dominate trade negotiations between nations • seller and buyer meet directly, regardless of distance or time zones • consumers are directly integrated into development and internationalization processes • user communities and social media enable firms to test and adapt offers to local markets and to diversify activities.	*Published* in Technology Innovation Management Review
2	Digitalization, Entrepreneurial orientation and internationalization of micro-, small- and medium-sized enterprises	Quantitative study	Results outline through the conceptual process that: • the more MSMEs are digitalized, the more they lead their strategic decisions with entrepreneurial behaviors (EO) and, • the more MSMEs favor entrepreneurial behaviors (EO), the more they increase their internationalization intensity in terms of scope and speed.	*Published* in Technology Innovation Management Review
3	The degree of digitalization and entrepreneurial orientation of internationalizing micro-, small- and medium-sized enterprises: the mediating roles of self-concept traits	Quantitative study	Results of the parallel mediation exhibit that: • self-efficacy – an *individual's beliefs in their capabilities to generate given attainments* – can be a way forward to strategically use digital technologies to reinforce the entrepreneurial behaviors (EO) of internationalizing MSMEs. • locus of control – an *individual's ability to exercise control over the environment* – has no mediating effect on the relationship among the use of digital technologies and entrepreneurial behaviors (EO) of internationalizing MSMEs.	*Accepted in* The challenge of supporting innovation and internationalization in SMEs: A crossroads perspective

1.4.4 Thesis main result

In compiling the results of the three articles, the research provides an answer to the governing research question; *How can MSMEs use digital technologies to achieve entrepreneurial and competitive international activities in a digital context?* The main result of the thesis is an overall conceptual process that considers the key dimensions of digitalization, the entrepreneurial behaviors of firms and individuals, as well as the internationalization of firms. This overall conceptual process will be discussed in more detail in the concluding part. To provide a succinct view of the main result, Figure 8 illustrates the overall conceptual process developed from the three scientific papers. First, it considers the use of digital technologies as an input for entrepreneurship opportunities (Giones and Brem, 2017), as well as a major change in the nature of entrepreneurial process, outcomes and locus of entrepreneurial agency (Nambisan, 2017). Second, it links the dimensions of digitalization and internationalization through entrepreneurial behaviors of firms. The research thus integrates into the conceptual process the concept of EO, which provides key capabilities for building competitive advantage in foreign markets (Lumpkin and Dess, 1996). Third, the conceptual process considers the role of entrepreneurial behaviors of individuals a crucial lever to make effective use of digital technologies and drive EO. It therefore postulates that the behaviors of individuals, in other words, the behaviors of entrepreneurs, are the central driver for discovering and exploiting the opportunities offered by the digital context to build competitive advantage (Schumpeter, 1934). Finally, the output of the overall conceptual process is the achievement of entrepreneurial and competitive activities of internationalization in a digital context.

Figure 8 – First representation of the overall conceptual process



2 CHAPTER – ARTICLE #1

Internationalization and Digitalization: Applying digital technologies to the internationalization process of small and medium-sized enterprises

"*The biggest part of our digital transformation is changing the way we think.*"
Simeon Preston
Managing Director & COO
FWD Insurance

2.1 ABSTRACT

Digitalization is playing an increasingly important role in the growth of firms and is leading to structural and strategic transformations. The use of digital technologies presents new opportunities for SMEs to expand and succeed in foreign markets. The purpose of this paper is to investigate how the impact of digital technologies on the internationalization process of SMEs has been acknowledged in the literature. It offers an in-depth analysis of five of the most highly relevant recent scientific research papers. The findings are synthetized through key points that highlight how SMEs acting in foreign markets could benefit from digital technologies. This paper complements previous research on the international trade transition initiated by digital technologies and provides a new perspective on contemporary research regarding the internationalization of firms. It concludes by identifying implications for research by scholars seeking to further study the digital aspects of traditional theoretical models of internationalization.

2.2 INTRODUCTION

Businesses and societies are undergoing a process with multiple transformations. Both are operating within broader complex economic systems. Businesses themselves therefore must understand, in concrete terms, the many elements of dynamic interaction involved (Morua et al., 2015).

With the advent of digital technologies, a new social paradigm is emerging, and disruptive changes are an important part of future progress. Characterized by the convergence of many emerging technologies, whose core is data (big data, artificial intelligence, internet of things, etc.), digitalization leads firms to radical transformations in their systems and processes, as well as in their management methods and workforce. For instance, by reducing operating costs and improving interactions among ecosystem stakeholders – including customers, partners, suppliers and distributors - nascent digital technologies are playing an increasingly important role in company growth (Nambisan, 2017; Reuber & Fischer, 2011, 2014). Digitalization has started to be addressed at a scientific level in the fields of entrepreneurship and management research, among others (Kraus et al., 2019). However, although international research has been fundamentally influenced by the pervasive effects of technological advances for many years, relatively few studies have

investigated emergent digital technologies to theoretically understand and empirically test their attributes in international business management (Hannibal & Knight, 2018; Brouthers et al., 2018, 2016; Neubert, 2018; Ojala et al., 2018; Stallkamp & Schotter, 2018; Watson et al., 2018; Wittkop et al., 2018; Coviello et al., 2017; Strange & Zucchella, 2017; Autio & Zander, 2016; Tanev et al., 2015).

Our research builds upon the recent Hervé et al. (2020) paper, aiming to study the effects of digital technologies on the internationalization processes of small and medium-sized enterprises (SMEs). To this end, the research performs an in-depth analysis of five relevant scientific papers. By using insights and arguments from the literature of international business (IB) and international entrepreneurship (IE), we identified four main fields of activities that are at the center of interest for entrepreneurs when acting in international businesses: cost, accessibility, resources and competences; market knowledge; distance and location; relational competences and partner networks. The purpose of our study is to provide a synthesis of the key insights articulated in the five papers and highlight the main impact of digital technologies on these four fields of activities. It aims to contribute to IB and IE research by offering a better understanding of how the use of digital technologies can lead to new entrepreneurial opportunities in foreign markets. This objective is grounded in the current need to contribute to the development of new theoretical foundations for empirical research on internationalization on the interface of IB and entrepreneurship (Keupp & Gassmann, 2009).

By integrating new digital technologies into the value chain and managing a massive amount of data, firms are likely to seize new opportunities with innovative ways to reach potential customers and be instantaneously active on a global scale. In general, digitalization impacts internationalization processes of firms in terms of accessibility of resources, skills, and competence acquisition, as well as in terms of the potential for learning and knowledge-development in foreign markets (Coviello et al., 2017). Other parameters, like location and entry mode choices or time and expansion rate, are also influenced by digital technology usage.

However, in the literature, internationalization theories and models have not been adequately adapted to the possibilities and challenges provided by digital environments. This has been observed mainly through Johanson and Vahlne's (1977) stage model theory, which emphasizes a progressive engagement at the international level, while borders are now becoming more "dematerialized" (Stallkamp & Schotter, 2018). By questioning this stream of thought, scientific debates about the potential impact of the digital context emerge and constitute the starting point of this research (Kriz & Welch, 2018; Coviello et al., 2017). Based on theoretical insights from IB, IE and literature from digital entrepreneurship and information systems, the paper makes a contribution by providing a synthesis that outlines how digital technologies impact the internationalization process of SMEs. To conclude, we discuss the results and highlight suggestions for future research. The paper also responds to recent calls for more research on the phenomenological field of IB in digital contexts (Coviello et al., 2017).

2.3 LITERATURE REVIEW

2.3.1 Internationalization of firms

The internationalization of firms is a subject of interest for numerous scientific communities and has been addressed for several years. Over time, IB theories have suggested different internationalization approaches, that have been aimed mainly at large companies. The stage model approach considers internationalization as a linear and sequential process (Johanson & Vahlne, 1977). According to this model, a firm's knowledge is acquired gradually over time through experience, which is the most crucial resource needed in foreign markets. The authors of the related Uppsala model consider market knowledge (general and experiential) combined with the commitment of resources, as factors influencing engagement decisions and ongoing business activities in foreign markets (Johanson & Vahlne, 1977).

Although various IB theories have coexisted in the literature for several decades, the stage model has been often criticized and the scientific community has gradually relativized its universality (Knight & Liesch, 2016; Welch et al., 2016; Welch & Paavilainen Mäntymäki, 2014; Forsgren & Hagström, 2007; Andersen, 1993; Sullivan & Bauerschmidt, 1990). In response to taking a sequential approach, numerous authors have studied alternative internationalization paths (McAuley, 2010; Ruzzier et al., 2006; Nummela et al., 2006; Lu & Beamish, 2001; Gankema et al., 2000; Coviello & McAuley, 1999; Oviatt & McDougall, 1995). The increasing emergence and growth of entrepreneurial firms aiming at rapid internationalization enabled the development of new perspectives on internationalization models that were more relevant for SMEs.

The emphasis on SMEs firms in scientific research clearly demonstrates their decisive role in global industries. This has given rise to a new current of research developed at the intersection of IB and entrepreneurship theories, now called IE. This research field specifically studies small and young firms that venture abroad from their inception or soon after their launch (Reuber et al., 2018; Autio, 2017; Knight & Liesch, 2016; Jones et al., 2011; Baldegger & Schueffel, 2009; Keupp & Gassmann, 2009; Oviatt & McDougall, 2005; Rialp et al., 2005; Zahra & George, 2002; Oviatt & McDougall, 1994). Even if multinationals and small companies have a very similar process for managing their international activities (Oviatt & McDougall, 1995), the impact of globalization on SMEs is particularly strong and even more significant than on large companies (Ruzzier et al., 2006). Furthermore, being more comfortable with technology and more reactive to innovations, small firms can be actively engaged in business outside of domestic markets, and thereby benefit from global trade despite having limited initial resources (Knight & Liesch, 2016). As these firms discover ways to quickly achieve their international objectives, the IE approach is better adapted than the traditional IB theories. However, although this emerging discipline has grown exponentially, the theoretical foundations of IE remain somewhat fragmented, and too generalized (Jones et al., 2011; Keupp & Gassmann, 2009). Especially due to the lack of a common conceptual framework, IE scientific research has been dominated by concepts that emerge from mainstream IB theories (Keupp & Gassmann, 2009).

2.3.2 Digitalization in firms

To explain the emergence of digital technologies, our research applied the insights of Autio (2017), along with Bell and Loane (2010). The first wave started in the early 2000s with the emergence of Web 2.0 technologies. The introduction of mobile operating systems (iPhone and Android), storage solutions on computer servers (cloud computing), learning algorithms, and big data technologies marked the next significant developments. Data feeds all of these technologies. Its collection and analysis have thus become more accessible for the development of user-centric and knowledge-driven products and services. Digital technologies, such as artificial intelligence, can now be applied to optimize production and distribution, to improve managerial decisions for market entry, to target new customers more effectively, to select relevant partners, to supplement advertising strategies, to take better pricing decisions and to make demand predictions (Kraus et al., 2019; Aagaard et al., 2019; Watson et al., 2018). 3-D printers also represent a crucial advance in manufacturing techniques and allow companies to revolutionize their production and better customize each product to meet the end users' needs. Another major technological advance is the Internet of Things (IoT). This consists of integrating sensors able to collect and process data into smart products and devices, which can thus communicate and interact with each other (Rüßmann et al., 2015). Finally, firms perceive new opportunities with blockchain technology, which has been defined as, "*an open, distributed ledger that records transactions between two parties efficiently and in a verifiable and permanent way*" (Iansiti & Lakhani, 2017). Distributed ledger (aka "blockchain") technologies provide firms with storage and transmission of information that is transparent, secure and which operates without third parties based on code.

Thanks to these recent technological advances, powerful information processing and storage resources are now widely available. The widespread adoption of these constituent technologies creates an enabling business environment. On one hand, it enriches interactions between individuals and, on the other, opens opportunities to improve value creation. To recognize opportunities and take advantage of these available tools, companies are faced with a transformation across their entire organization and activities (Kraus et al., 2019; Matt et al., 2015; Porter & Heppelmann, 2015; Bharadwaj et al., 2013). Moreover, because digital technologies support companies at different levels, whether for creating, producing, selling and marketing, delivering, or supporting, they also involve disruptive changes in the value chain (Porter & Heppelmann, 2015).

Ross and colleagues (2017) distinguished two steps in the transformation; become digitized and become digital. The first step takes place at the operational level and involves standardizing business processes and optimizing operations by implementing technologies and software. The second step involves purely digital technologies to articulate, target, and personalize alternative offers in order to define a new value proposition. It is, therefore, by taking the opportunity to redefine its business model and activities that a company becomes digital (Aagaard et al., 2019; Kraus et al., 2019; Ross et al., 2017).

2.3.3 Digital internationalization

Since the late 1990s, online sales turned to a new internationalization model. By dematerializing borders and reducing costs, e-commerce fundamentally changed the way business was conducted (Tiessen et al., 2001). Exporting to foreign markets through online sales became a significant competitive strategy. Is particularly true for SMEs (Gabrielsson & Gabrielsson, 2011).

Often faced with a lack of resources, the internationalization path has increased SMEs' agility in targeting markets and expanding their network (Watson et al., 2018; Mathews et al., 2016; Bell & Loane, 2010; Foscht et al., 2006). A study by Coviello and colleagues (2017) recognized that nascent digital technologies have democratized global consumption, paved the way to a wide database for knowledge acquisition in foreign markets, improved communication and information exchange, and facilitated cross-border transactions by increasing intangible flows and reducing location dependencies. These technologies will lead firms to base their production decisions more on proximity to customers than on production costs (Hannibal & Knight, 2018; Strange & Zucchella, 2017)

2.4 METHODOLOGY

2.4.1 Data collection

literature and synthesizes the key insights on how digital technologies impact the internationalization process of established SMEs. Little previous research has focused on the integration of purely digital technologies into the internationalization process of established small firms. Therefore, due to an insufficient and highly fragmented research basis, a systematic approach could not be pursued. The limited number of articles corresponding to our criteria led the data collection towards a rather systematically performed traditional review.

The literature search was bound by specific factors. First, an articles search was performed with SAGE Journals, Google Scholar and Ulysses search engines, and came mainly from scholarly publishers, like Emerald, Springer, and Elsevier. Given the novelty of the subject, it was not possible to limit our research to peer-reviewed articles. We have thus expanded our investigations to include conference papers. We started the search with two main terms, "internationalization" and "digitalization", which, however, did not yield sufficient results to allow further investigation. Therefore, the study broadly expanded the targeted research on themes and keywords: "internationalization theory", "international entrepreneurship", "digital internationalization", "digital technologies", "digital entrepreneurship", and "digital transformation". The search was limited to English papers in the period 2016-2018. Finally, we considered only articles that used the term "digitalization" in the sense of applying purely digital technologies.

2.4.2 Data analysis

Once the relevant articles were identified, we conducted an in-depth analysis and comparison of the articles. After completing the analysis, five suitable papers that offered more systematic reviews and incorporated most of the points found in other articles were selected. The novelty of the field could explain the lack of systematic studies. Thus, our choice of these five articles allowed us to adopt a more systematic approach to the synthesis of the key insights. In addition, we observed that the five studies complement each other in terms of specific insights.

Each of the studies was analyzed based on the title, publication period, theoretical framework used, and key findings (Table 2). All studies were first reviewed at an aggregate level to determine general directions. Although the perspective of analysis differs greatly from one study to another, the synthesis we present here is designed through four selected fields of activities related to the main internationalizing criteria. These are: costs, accessibility, resources and competences; market knowledge; distance and localization; and relational competences and partner networks.

2.5 RESULTS

2.5.1 Costs, accessibility, resources and competences

Coviello et al. (2017) and Brouthers et al. (2018, 2016) agree that digitalization has a positive impact and helps companies in managing the risks associated with potential additional costs from their operations abroad (liabilities of foreignness). In their arguments, these authors suggested that technological advances also dematerialized distribution and production channels. These circumstances allow companies to specifically decrease transaction costs in foreign markets. For example, the use of IoT will result in changes in the management of geographically dispersed value chains and thus allow firms to reduce costs related to their international production (Strange & Zucchella, 2017). Furthermore, by exploiting digital tools, Autio and Zander (2016) argue that internationally active small firms can significantly reduce the amount of assets needed for operations, as well as cost of location specificity. Because commercial activities are managed remotely, SMEs operating digitally in international markets appear to be able to generate alternative revenues without making significant investments. Resource allocation in several markets, transaction time-savings, and more optimized decision-making processes are additional effects of digitalization.

At an international level, SMEs need to maintain a specific advantage that differentiates them from local competition. To achieve this, they can aim to maximize their entry-mode attractiveness by targeting a niche market and offering innovative high-quality products. Another way is to collaborate with specific local distributors that are already integrated in a large network. By reducing operating costs and improving communication and interaction with all ecosystem stakeholders - including customers, partners, suppliers, and distributors - digital technologies present new opportunities in terms of skill sharing, open innovation, co-creation, and partnership between companies (Coviello et al., 2017).

2.5.2 Market knowledge

Stage model theories have emphasized that a firm's speed of internationalization depends heavily on its ability to acquire new knowledge about foreign markets. One of the most significant changes related to the acceleration of online exchanges is the ability to capture and disseminate a considerable amount of data (Neubert, 2018). As it is now possible to directly interact with customers, companies can better understand customer needs and personalize their services and offers. Furthermore, by enhancing machine-to-machine and machine-to-human interaction, IoT facilitates product customization. In addition, 3-D printers provide customers with greater influence over the design of their products and over the control of manufacturing origins (Strange & Zucchella, 2017). Thanks to these technologies, firms will better meet end-user requirements. Digitalization in such ways provides new fundamental experiential knowledge to companies.

Autio and Zander (2016) suggested that by combining the theoretical principles of *Lean Entrepreneurship* with the use of digital technologies, like big data and analytics, companies can conduct market experiments faster and in more countries. This allows firms to test products and services directly on potential customers in advance, no matter their location in the world (Strange & Zucchella, 2017). Thanks to these experiments and the market knowledge gained from them, companies have learned how to perform better and benefit from direct contact with consumers by better adapting and customizing their offers (Strange & Zucchella, 2017). Thus, they can frequently introduce advanced versions of their products and services (Strange & Zucchella, 2017; Brouthers et al., 2018, 2016). To improve their position abroad, companies use feedback and comments shared on user community platforms or social networks. These online apps are flourishing with the advent of digital technologies. For that reason, idea sharing is fundamental for market adaptation, as it allows companies to anticipate their marketing efforts, and deploy better-targeted marketing and prospecting activities (Brouthers et al., 2018, 2016). By communicating with user communities, SMEs become more responsive to implementing the necessary measures and, consequently, optimizing speed and marketing gains.

Emerging digital technologies are based mainly on the accessibility of internal and external data (Neubert, 2018). The collection of this abundant data (for social or commercial networks, or intellectual market knowledge) is a valuable source of information for companies and reduces cross-border information asymmetry (Autio & Zander, 2016). The data can be processed by predictive algorithms to assess a company's current conditions and future market attractiveness (Neubert, 2018). The decision-making process is also supported by more advanced data-mining techniques, such as machine learning. Based on artificial intelligence and statistical approaches, this technology helps firms to model and interpret collected data for strategic purposes. Market knowledge with deployment of user communities, data collection, and new sources of accessible information underline the market-based approach of most SMEs.

2.5.3 Distance and location

The digitalization effects on distance and location are manifested mainly by border dematerialization and the acceleration of internationalization operations. Not only can a company manage its international activities online, reduce psychological distances, and multiply targeted countries, but the activities will also be led by business networks and user communities. Nascent digital technologies are transforming the location and organization of manufacturing production worldwide and will encourage firms to favor decisions based on proximity with customers rather than production costs (Strange & Zucchella, 2017). In their research, Autio and Zander (2016) affirm that digitalization offers greater transferability of firm-specific assets. It allows small, internationally active firms to benefit from reduced dependence on location-bound assets in home and host countries (Coviello et al., 2017).

SMEs are often strongly advised to use rapid access to international trade promoted by digitalization. These pioneer leading firms create new opportunities to manage their activities from a distance and thereby reach a larger number of markets with the same productive resources by, for example, externalizing location-specific assets. Another aspect linked to distance and location was raised by Brouthers and colleagues (2018, 2016). They argued that when entering a foreign market, SMEs are confronted with new internationalization obstacles called "liabilities of outsidership". This concept suggests that when a firm reaches a new market, it usually has few relations with other firms, and is consequently considered an outsider. Firms applying nascent digital technologies can counter this liability by generating value through the creation and coordination of a network of users via the construction and management of digital platforms.

However, although a platform is easily replicable from one country to another, transferring the user bases is more difficult. Therefore, small firms are forced to quickly reach a critical mass of users to establish themselves in foreign markets (Brouthers et al., 2018, 2016). A limited number of users does not encourage further interactions and makes market entry harder. And in most cases, because platform costs exceed expected profits, the expansion rate can be significantly slowed down. To counter this, companies need to succeed in attracting potential users to adopt and populate their platform, and rapidly develop a large community of users (Brouthers et al., 2018, 2016).

2.5.4 Relational competences and partner networks

Markets are mainly relationship networks that firms maintain with their distributors, suppliers and customers. Over time, internationalization theories have emphasized the importance of building and integrating networks on a global scale. However, the digital context challenges the very foundations of network theory, such that it is now necessary to fundamentally rethink our actual understanding of relationships across international trade (Autio and Zander, 2016).

First, there are a growing number of market participants acting on both sides, as sellers and as buyers (Coviello et al. 2017). This allows SMEs to integrate customers into their ecosystem and develop direct contact with them. More

precisely, Strange and Zucchella (2017) argued that firms can now involve customers as providers of key information and feedback on products, and even as local manufacturers. These authors pointed out that the relationship between firms and customers changes dramatically and gets redefined in many ways. Second, markets are current, momentaneous and dedicated to specific transactions (Coviello et al., 2017). This makes it more difficult to conclude long-term relationships with actors integrated at the time into any network in question. Because digital technologies are increasing the number of instantaneous, brief and interrelated interactions, the pace of these encounters is also accelerated. It thus allows firms to speed up their market adaptation to reach several new foreign markets at the same time (Coviello et al., 2017). Finally, the intensified used of the Internet has initiated and amplified the creation of one large virtual global "market" for trade involving economic and social transactions, as well as exchanges of tangible and intangible goods (Coviello et al., 2017). This development has led to a broadening market scope, and also afforded better access to local market actors and partners.

Thanks to the wide flow of data, SMEs are now often more oriented towards exchanges than production (Coviello et al., 2017). And these exchanges seem to provide new opportunities for international trade. Indeed, companies have increased access to local knowledge and simultaneously can enhance the reliability of their main relationships. By sharing data and skills with partners, SMEs have new possibilities for integrating targeted networks. To maintain these exchanges, decision-makers are recommended to set up processes and mechanisms to arrange relationships developed with a diversified and dispersed set of actors, both internally and externally (Coviello et al., 2017). Small firms likewise should aim to multiply user communities in several countries, while making sustained use of social networks and mass media deployed there (Brouthers et al., 2018, 2016). In their research, Brouthers and colleagues (2018, 2016) also suggested collaborating with opinion leaders and change agents in foreign markets. These well-known actors and public figures can serve as powerful levers in social media and user communities around the world. They can help a company become known quickly and build its online reputation, resulting in small firms internationalizing faster.

2.6 DISCUSSION

This paper combines two research streams to understand their links and relationships. Through our observations, we first noticed a lack of congruence in internationalization research between existing models and the actual environments in which SMEs operate. Then, by taking into consideration scientific research focused on digitalization, we found that there are many untapped entrepreneurial opportunities for firms to undertake successful international trade. These findings corroborated the need to address the digital issue on traditional internationalization theories and allowed us to highlight the main effects of digital technologies on the activities of small firms abroad. Through the results shown in Table 3, we clarified how SMEs can use digital technologies to achieve successful international activities.

International trades are transforming and dematerializing the rate of digitalization. Our results highlighted the dynamic of a current, international environment constantly in movement. SMEs are immediately connected on a global scale without necessarily requiring specific resources or business networks. Here are some of their impacts:

- they are threatening large companies by sharing their skills via large groups of entrepreneurs;
- transaction costs are significantly reduced;
- communication, distribution, and production channels are dematerialized;
- markets are virtual, instantaneous, and more competitive;
- physical flows are giving way to data flows;
- geographical distances are virtually reduced and allow partner networks to largely dominate trade negotiations between nations;
- seller and buyer meet directly, regardless of distance or time zones;
- consumers are directly integrated into development and internationalization processes;
- and, the emergence of user communities and social media enables firms to test and adapt offers to local markets and, in some cases, to diversify activities.

Digitalization has removed many international barriers and allows larger SMEs to engage in international markets and act like micro-multinationals. Nevertheless, the impact of fundamental uncertainty (Kraus et al., 2019; Ojala et al., 2018) and the need to take into account non-linearity and interdependencies in the internationalization process, increase complexities for entrepreneurs, and have a direct impact on the entrepreneurial competences needed in foreign markets. Thanks to our research, we noticed that entrepreneurs and managers are widely encouraged to effectively integrate their organizational capacities and skills, strategically position themselves as market participants, and actively drive their own ongoing digital transformation.

Nowadays, the use of technologies impacts firms by enabling a transformation of not only their operations, offerings and value propositions, but also by enhancing their interactions with customers. Furthermore, it supports the firms' numerous organizational and strategic aspects and allows them to overcome several internal barriers. For instance, at a strategic level, nascent digital technologies affect the configuration and coordination of the entire value chain. They can create essential networks and sources of data that aid and allow firms to directly find investors, recruit talent, and solicit opinion leaders or change agents. Our findings show that digitalizing business functions could involve redesigning a firm's business model in a way that enables new opportunities for internationalizing, creating value, and developing customer relationships. For instance, digitalization facilitates a "servitization" transition in some companies, which

means adding different services to complement an earlier product offer, and, thus, adds support for the customer in a broader way (Aagaard et al., 2019).

There are essential factors involved when defining the international scalability of an SME's business model. A B2C-oriented business model designed to reach critical mass that combines with user engagement and a collaborative approach is one of these essential factors. Digitalization will also change the production, transportation, and logistics patterns. In their research, Hannibal and Knight (2018) mentioned the "deglobalized" production and other strategic opportunities with regard to diversification. For example, the use of 3D-printers will allow firms to base their production site closer to consumers and, in this way, favor customization and reduction of transportation and logistics costs. Based on these results, our research calls into question the "international" dimension of international trade. Instantaneous access to foreign markets is a reality and, as shown in our results, a greater role to be played by nascent digital technologies is just beginning to happen.

2.7 CONCLUSION AND AGENDA FOR FURTHER RESEARCH

In the light of increasing digitalization, our paper contributes to the literature by providing a new perspective on contemporary research involving internationalizing companies. It presented an in-depth analysis of five scientific research papers and aimed at understanding international trades in transition as initiated by global digital technologies. From a managerial point of view, our study addressed digitalization issues involved at the firm's structural and strategic level. Linked with standard internationalization criteria, key points identified in our research (Table 3) show how managers acting in foreign markets could benefit from digital technologies. We are convinced that the convergence of globalization and digitalization clearly demonstrates the need for business leaders and decision-makers to reassess their strategies. As we are still early in the digital era, significant opportunities remain to be seen. However, most managers currently have little theoretical knowledge of digitalization history or trends. Managers may benefit from the use of digital tools in several ways if they can rapidly master and integrate them into their internationalization process. The faster a company understands the benefits of using digital technologies, the faster it can improve its decision-making processes and accelerate its internationalization speed (Neubert, 2018). In these circumstances, future research should focus on using quantitative and qualitative data to empirically study the effects of digitalization on internationalization processes. Such data would be valuable to help define how the use of digital technologies affects internationalization models and strategies. In the literature, the risks of digitalization in international trade are not empirically addressed. Although the research we conducted agreed that the use of digital tools has a positive effect on international expansion, the limits of digitalization could be an avenue for future research. Indeed, risks related to digital internationalization, like the increase of price pressures, intensification of aggressive global competitiveness, cybercrime, and the lack of global legal protections, are some examples of topics still largely unexplored. Concerning legal protection, new institutional arrangements and standards will emerge to regulate the growing interconnectivity and

complexity generated by digital environment, and companies will likewise face new entry barriers and regulatory compliances imposed by governments.

Another interesting research orientation related to digital internationalization is the context of emerging economies. Because the world is more interconnected than ever, scientific research related to internationalization theories should pay more attention to emerging countries, where a multitude of niche markets are rapidly flourishing thanks largely to digitalization, and its "leapfrog" potential. It is the first time in history that emerging markets have become counterparts in more than half of global trade flows, while South-South trade between nations is the fastest growing type of connection (Manyika et al., 2016). In view of the above, research into internationalization has, therefore, many unexplored avenues of study open and available regarding digital transformation. Researchers should focus on empirical data collection and adapt their approach to realities on the ground (Delios, 2017). Future research on digitalization needs to build new theoretical models better adjusted to the current international trade environment than the frameworks commonly found in the literature.

2.8 APPENDIX

Table 2. Overview of selected papers used in the synthesis

Authors (year)	Title	Scientific review	Research objective	Theoretical framework	Key results
Autio and Zander (2016)	Lean internationalization	*Academy of Management Proceedings*	This research explores how digitalization impacts expansion processes of INVs. By focusing on their business operations, authors explain how the use of digital tools affects international trade.	*Transaction cost theory* *Foreign entry mode* *International Entrepreneurship*	Through several proposals, the researchers present the main effects of digitalization on the INV internationalization process. Their proposals suggest that digitalization mainly reduces geographical distances, the specificity of vertical and horizontal assets, and cross-border information asymmetries. By linking lean entrepreneurship practices to digitalization, the authors formulate a new theoretical lens: *Lean Internationalization*.
Coviello and al. (2017)	Adapting the Uppsala model to a modern world: Macro-context and micro-foundations	*Journal of International Business Studies*	This study is a counterpoint to the last Uppsala model version (2017). It examines two missing dimensions to the model: the impact of the digital context at a macroeconomic level and the role of decision-makers at a microeconomic level.	*International Business Entrepreneurship* *International Entrepreneurship*	Research results underpin the importance of studying the digital context at a macroeconomic level to create and exploit new opportunities in foreign markets. Based on the Uppsala model, the authors develop a three-level conceptual framework. This model integrates the macro and micro characteristics studied in their counterpoint.
Strange and Zucchella (2017)	Industry 4.0, Global Value Chains and International Business	*Multinational Business Review*	Based on the main digital technologies (IoT, big data and analytics, robotic systems, and 3D-printers), this research aims to assess how their adoption impacts the location and organization of activities in global value chains.	*Industry 4.0* *International Business*	The authors report the way in which digital technologies are disrupting how and where activities are located and organized within global value chains as well as who captures the value added within those chains. Through real facts, their research explains the concrete effects of digital technologies on the practice and theory of international business.
Brouthers et al. (2018, 2016)	Explaining the internationalisation of business firms	*Journal of International Business Studies*	The authors extend internationalization theories to digital firms. Based on a literature review and case studies, they examine and compare the internationalization process of such firms.	*International Business* *Social network theory* *Diffusion of innovation theory*	Thanks to the use of platforms, the authors suggest that digital firms are less impacted by the liabilities of foreignness. On the other hand, these digital companies might suffer from a lack of relationship with existing networks and be faced with more difficulties in developing potential collaboration across foreign markets (liabilities of outsidership). Based on a multi-case study, their research develops a new theory and testable hypotheses.
Neubert (2018)	The impact of digitalization on the speed of internationalization of lean global startups	*Technology Innovation Management Review*	This research aims to demonstrate how the use of digital technologies in the expansion process accelerates the internationalization rate of Lean Global Start-ups.	*Lean Global Startup* *International market development processes*	Results confirm a significant and positive impact of digitalization on the start-up internationalization process. The authors suggest that the integration of digital technologies allows companies to deploy new knowledge, to rapidly integrate relational network, to improve the efficiency of decision-making processes and, finally, to accelerate the speed of internationalization.

Table 3. Digital effects and opportunities for international trades

	Digitalization effects on internationalization activities	**Opportunities for defining new value propositions through digital use**
Costs, accessibility, resources, and competences	• dematerialization of distribution and production channels • reduction of assets and location specificity • improvement of interaction and exchanges • reduction of additional cost for foreign operations • resource allocation in several markets • time-saving transactions • optimization of decision-making processes • asset specificity attenuated • acquisition of specific resources and competences • reduction of customers' acquisition costs	Alternative revenue through digital platforms and infrastructures
		Targeting niche markets and innovative high-quality products
		Sharing of skills and capacities between companies
		Open innovation and co-creation with partners and customers
		Partnership with other companies
		Integrating IoT into the value chain to reduce production costs
		Local market development
		Investment in qualified human capital
Market knowledge (general and based on experience)	• accessibility to large information databases • exchange and processing of large amounts of data • deployment of numerous online user community platforms or social networks • faster and more efficient adaptation to markets • better analyses of market attractiveness • optimization of internationalization speed and marketing gains • cross-border information asymmetry attenuated • more efficient decision-making processes • emergence of more advanced data-mining techniques (machine learning)	Better customize and personalize offers, services and the customer experience
		Regular market experiments for product and service adaptations
		More frequent introduction of new product or service versions
		Using customer feedback and comments
		Better targeted marketing and prospecting activities
		Data collection and use of predictive algorithms for modelling and interpreting data
		Using data to anticipate consumer behavior
Distance and location (psychological and physical)	• border dematerialization • acceleration of internationalization operations • reduction of psychological distances • activities led by networks rather than countries • greater transferability of a firm's specific assets • less specificity related to location • reduction of dependence on location-bound assets • management of international activities from a distance • creation of networks of users via platforms • democratization of consumption • better access to new targeted markets	Reaching a large number of markets with the same production resources
		Externalizing location-specific assets
		Developing a large community of users
		Partnerships with local companies via platforms
		Licensing products and services to local firms
		Sharing production and distribution sites
		Prioritizing decisions on proximity with customers over production costs
		Local and niche market development
Relational competences and partner networks	• increasing number of actors in markets • momentaneous markets for specific and faster transactions and interactions • larger market scope for selecting targeted markets • creation of one large virtual market for international trades • better access to local knowledge, network skills and market actors / partners • exchange-oriented rather than production-oriented • better reliability in relationships	Developing direct interactions with customers
		Data and skills sharing between partners to reach targeted networks
		Setting up processes and mechanisms to maintain relationships
		Using multiple user communities in several countries
		Making sustainable use of social networks and mass media
		Collaborating with opinion leaders and change agents
		Building and maintaining a strong online reputation

Source: from the authors

3 CHAPTER – ARTICLE #2

Digitalization, Entrepreneurial orientation and internationalization of micro-, small- and medium-sized enterprises

"*In the new world, it is not the big fish which eats the small fish, it's the fast fish which eats the slow fish.*"

Klaus Schwab,
Founder and Executive Chairman,
World Economic Forum

3.1 ABSTRACT

Nowadays, we are living in a digitally connected global economy that is completely transforming trade in foreign markets and exposing firms, particularly micro-, small- and medium-sized enterprises (MSMEs), to major changes and new opportunities. As the use of digital technologies is creating more fluidity and nonlinearity across time and space in entrepreneurial processes, our research adopted a conceptual process to investigate how the digital transformation of MSMEs will support decision-makers in international businesses. Based on a quantitative research design, we demonstrate that the more a company digitalizes its functions, the more it favours entrepreneurial behavior to lead successful strategic decisions in foreign markets. Our results are discussed in detail and we propose several ways to benefit from opportunities arising from the use of digital technologies.

3.2 INTRODUCTION

With the advent of digital technologies, a new industrial revolution has arrived, bringing disruptive changes along with future progress (Schwab, 2017). At the heart of this, businesses and society are transforming in such a way that institutions are faced with a fundamental need for radical changes in their structure and operating methods. They are developing complex economic systems that must grasp, in a concrete manner, many elements involving dynamic interactions (Morua et al., 2015). Nowadays, the digital context is transforming the very paradigm of international business. This requires companies to find new opportunities to maintain their competitive advantage not only domestically, but also abroad. The changes are major and, given the fact we are living in an increasingly hyperconnected world, micro-, small- and medium-sized enterprises (MSMEs) are particularly exposed to new challenges and opportunities in foreign markets (Manyika et al., 2016).

For decades, trade in goods and services between nations has defined the image of globalization. However, although the dynamics of physical flows are currently moderate, globalization is not slowing down. On the contrary, many flows of data continuously move across borders and their volume has increased considerably. As a result, globalization is dematerializing and redefining itself with the faster pace of these information and data exchanges. In this context, digital

technologies and platforms have been created to reach new markets, serving to resize the economics of cross-border business, notably by reducing costs, shortening transactions and increasing market knowledge through greater interactions. In other words, as outlined by Manyika and colleagues (2016), *digital globalization is changing who is participating, how business is done across borders, how rapidly competition moves, and where the economic benefits are flowing*.

To date, research has clearly demonstrated that in order to make a difference in foreign markets, companies need to adopt an entrepreneurial orientation (EO) by being innovative, proactive, and risk-taking in their decisions. Because emerging technologies are creating more fluidity and nonlinearity in entrepreneurial processes and activities across time and space (Nambisan, 2017), we are convinced their use supports firms in adopting new behaviors for differentiating themselves from competitors, anticipating future changes, and undertaking investments with uncertain results. Indeed, the use of digital technologies – and, in particular, their convergence - offers a range of possibilities to optimize operations and redesign value creation. Over the last decade, research has been conducted to address either particular aspects of digitalization and internationalization of firms (Ziyae et al., 2014; Autio & Zander, 2016; Coviello et al., 2017; Hagsten & Kotnik, 2017; Strange & Zucchella, 2017; Brouthers et al., 2018; Hannibal & Knight, 2018; Neubert, 2018; Ojala et al., 2018; Stallkamp & Schotter, 2018; Watson et al., 2018; Wittkop et al., 2018; Enjolras et al., 2019) or EO and internationalization of firms (Knight, 2001; Jantunen et al., 2005; Covin & Miller, 2014; Brouthers et al., 2015; Reuber et al., 2018). However, few studies have relied on empirical evidence to test the effects of digitalization on internationalizing firms, and none of them have integrated the concept of EO.

In light of these observations, our research aims to propose a new look at traditional theories by introducing a conceptual process regarding the relationship between digitalization, EO, and the internationalization of MSMEs. On the basis of a quantitative survey, this study aims to (1) investigate the relationship between the degree of digitalization and the degree MSMEs' EO, and (2) investigate the relationship between each EO component and the internationalization intensity of MSMEs. The focus of the study is on gaining an understanding of how the use of digital technologies can support entrepreneurs' behaviors, that in turn, will support decision-making to enhance the propensity to internationalize. By exploring a significant phenomenon for the future of MSMEs (Manyika et al., 2016), the study aims to provide a new dynamic for contemporary research on globalization and to illustrate the reality on the ground (Delios, 2017).

3.3 LITERATURE REVIEW AND HYPOTHESES

3.3.1 International Entrepreneurship

Over time, researchers have incorporated multiple theoretical perspectives to explain the internationalization of firms. Although research initially focused mainly on large firms, many authors have explored the pattern and pace of internationalization of new ventures since the 1990s (Coviello & McAuley, 1999; Gankema et al., 2000; Lu & Beamish,

2001; Zahra & George, 2002; Rialp et al., 2005; Ruzzier et al., 2006; McAuley, 2010). The implications of this research resonate with the increasing amount of evidence compiled regarding entrepreneurial firms aiming at rapid internationalization, which are small, resource-poor, and in some cases at an early stage in their development. So far, conventional theories from international business have argued that smaller and younger firms were limited in resources and inexperienced in dealing with global trade (Brouthers et al., 2015). Traditional frameworks were based mainly on linear and sequential processes of internationalization, assuming that knowledge should be acquired gradually over time (Johanson & Vahlne, 1977). The emphasis on these smaller firms gaining a competitive advantage in multiple countries from inception has brought the emergence of a new research stream (Knight & Liesch, 2016); International Entrepreneurship (IE), where international business and entrepreneurship theories intersect. The interest here is in drawing a theoretical base and perspectives on MSMEs and young firms that venture abroad (Oviatt & McDougall, 1994; McDougall & Oviatt, 2000; Zahra & George, 2002; Oviatt & McDougall, 2005; Rialp et al., 2005; Baldegger & Schueffel, 2009; Keupp & Gassmann, 2009; Jones et al., 2011; Autio, 2017).

3.3.2 IE and Entrepreneurial Orientation

At the outset, IE was first defined as "*a combination of innovative, proactive, and risk seeking behavior that crosses national borders and is intended to create value in organizations*" (McDougall & Oviatt, 2000). This definition of IE is closely linked with the concept of EO, which is *the propensity to use new behaviors for anticipating and acting on future changes in the external environment, and the willingness to undertake investments with uncertain results* (Lumpkin & Dess, 1996). Researchers have suggested that EO provides one of the key capabilities for building competitive advantage in markets (Lumpkin & Dess, 1996). In IE, the popular emergence of the role of entrepreneurial behavior has been broadly investigated and gave birth to International Entrepreneurial Orientation (IEO), which is a multi-dimensional concept that captures the propensity of entrepreneurs to be innovative and proactive, and to take risks in an international context (Knight, 2001; Covin & Miller, 2014). According to this concept, EO seems to provide the company with skills to make better use of its internal resources, to obtain and exploit resources from external sources more efficiently, and thus, to enhance its internationalization prospects (Jantunen et al., 2005; Brouthers et al., 2015).

Notwithstanding the EO perspective (see this edition Baldegger, Caon, Sadiku, 2020), Oviatt and McDougall (2005) argued that the combination of innovative, proactive and risk-taking behaviors was not the only entrepreneurial dimension related to IE. Thus, they proposed an alternative view, one that was more focused on recognizing opportunities, thus defining IE as: "*the discovery, enactment, evaluation, and exploitation of opportunities – across national borders – to create future goods and services*" (Oviatt & McDougall, 2005). The inclusion of opportunity as a driver of internationalization has been recognized by prominent IE scholars but, as pointed out by Reuber and colleagues (2018), the meanings and roles of those opportunities remain underdeveloped.

Nowadays, with the burgeoning digital economy and global business ecosystems, factors enabling the discovery and pursuit of new opportunities have become more persuasive (Autio et al., 2018). These nascent factors are influencing the processes and strategies of internationalizing MSMEs by allowing them to rethink their business models thanks to the use of digital technologies (Andersson et al., 2014). In this context, several opportunities are emerging for defining new strategic orientations and new forms of internationalization (Coviello et al., 2017; Kriz & Welch, 2018) and, as mentioned by Knight and Liesch (2016), it is currently fundamental to study the role of digitalization in recognizing and exploiting those future opportunities for international trade. Thus, a wide body of literature has recently emerged that focuses on jointly addressing IE and digitalization (Kollmann & Christofor, 2014; Ziyae et al., 2014; Autio & Zander, 2016; Coviello et al., 2017; Etemad, 2017; Hagsten & Kotnik, 2017; Strange & Zucchella, 2017; Brouthers et al., 2018; Hannibal & Knight, 2018; Kriz & Welch, 2018; Neubert, 2018; Ojala et al., 2018; Stallkamp & Schotter, 2018; Watson et al., 2018; Wittkop et al., 2018; Chen et al., 2019; Enjolras, Camargo, Schmitt, 2019; Banalieva & Dhanaraj, 2019; Monaghan et al., 2019). However, studies have mainly tested the internationalization patterns of technological firms and little research relies on empirical data fo++r measuring how digital technologies affect the activities of established internationalizing MSMEs. Furthermore, as an investigation focusing on new digital opportunities with regard to the strategic position is overdue, we aim to address this gap in the literature by empirically testing how the degree of digitalization affects the orientation of firms, as well as how this orientation affects the intensity of internationalization. We propose a new look at traditional theories on internationalization by conceptually studying the process of relations between digitalization, EO, and internationalization of MSMEs.

3.3.3 Digital Entrepreneurship

Digital entrepreneurship (DE) emerged a decade ago at the intersection of digitalization and entrepreneurship. Principally based on a theoretical foundation of entrepreneurship, which involves recognizing, seizing and transforming opportunities into marketable goods or services to create new value, DE is of growing interest to more and more scholars (Hull et al., 2007; Davidson & Vaast, 2010; Giones & Brem, 2017; Nambisan, 2017; Le Dinh et al., 2018; Hsieh & Wu, 2019; Kraus et al., 2019). The origin of this research stream emerged following the rapid technological advances that have transformed the very nature of entrepreneurial activities and made it possible to overcome the uncertainty inherent in the processes and results of entrepreneurship (Nambisan, 2017). DE can be defined as a subcategory of entrepreneurship, "*the pursuit of opportunities based on the use of digital media and other information and communication technologies*" (Davidson & Vaast, 2010). Because digital technologies create more fluidity and nonlinearity across time and space into entrepreneurial processes, DE aims to define how these nascent technologies and their unique characteristics can be used to shape entrepreneurial activities and orientation (Nambisan, 2017). Research on DE is therefore growing at the heart of the digitalization phenomenon, which is often faced with

terminological confusion. By linking research work to information technology and DE, we provided a theoretical approach to these notions.

First, we drew a distinction between the two closely related concepts "digitization" and "digitalization". According to Tilson and colleagues (2010), the first term digitization is a "technical process" that renders technologies digital. It means converting and representing something analog or physical into a digital format that can be used by a computing system. Thanks to digitization, information can be standardized into the same format and be processed by the same technologies. Digitalization, on the other hand, is "*a sociotechnical process of applying digitizing techniques to broader social and institutional contexts that render digital technologies infrastructural*" (Tilson et al., 2010). In other words, it is the combination and application of digital technologies within an organization, economy, and society, in order to create and share value. Nowadays, many societies are experiencing a new wave of digitalization (Legner et al., 2017), characterized by the emergence and converging of many innovative technologies in the domains of robotics, artificial intelligence, the internet of things, mobile applications, augmented and virtual reality, big data, cloud, 3D printers, blockchain, nanotechnology, biotechnology, and quantum computing. The application and overlap of these digital technologies are impacting many segments of companies by drastically transforming and dematerializing temporal and spatial dimensions of businesses, as well as expanding global access.

3.3.4 DE and the role of entrepreneurs

To truly understand digitalization and the resulting creation and enactment of entrepreneurial opportunities, we address DE in a more applied context, thanks to expanding knowledge in the literature. The digital environment provides a competitive landscape in which taking an entrepreneurial strategic posture may be particularly beneficial to MSMEs. Because firms might be expected to preserve a market advantage by demonstrating innovative, proactive, and risk-taking efforts (Covin & Slevin, 1989), the use of digital technologies offers new opportunities to enhance current entrepreneurial orientation by optimizing processes, managerial, and strategic decisions (market entry, customer targeting, partnership, pricing decisions), and customization (Lumpkin & Dess, 2004; Watson et al., 2018; Kraus et al., 2019; Aagaard et al., 2019). Digital technologies create more variability in entrepreneurial activities and allow MSMEs to rapidly and easily enhance their capabilities and performance to create value (Lumpkin & Dess, 2004; Nambisan, 2017).

However, the widespread adoption of digital technologies has also changed the role of founders. Indeed, governance becomes less centralized and thus more distributed between groups of actors that share value creation (Nambisan, 2017). Although research on entrepreneurship has so far focused mainly on the entrepreneur as an individual who leads operations from the idea inception to its realization, the use of digital technologies is extending this role by allowing a broader set of actors, with different goals, to participate in entrepreneurial initiatives. As Nambisan (2017) highlighted, these new stakeholders, either individuals or ventures, are directly involved in opportunity recognition and processes

by, for instance, the use of digital platforms, social media, or even crowdsourcing and crowdfunding systems. This creates a global network with a plethora of new possibilities and opportunities for innovative collaboration, strategic alliances, co-creation, open innovation, networking, and creativity (Bell & Loane, 2010). However, the implementation of digital technologies has triggered a change in firms' functions. Entrepreneurs are then faced with transformation across internal and external dimensions of their business (Bharadwaj et al., 2013; Pagani, 2013; Gray & Rumpe, 2015; Matt et al., 2015; Porter & Heppelmann, 2015; Schallmo et al. 2017; Autio et al., 2018; Aagaard et al., 2019; Kraus et al., 2019). These dimensions can be categorized, as suggested by research carried out by Greif and colleagues (2017), through four main pillars of transformation, including at an internal level, processes and infrastructure (operations) as well as people and culture (training) and, at an external level, digital sales (experience) as well as customer involvement (relationship). By combining current capabilities with capabilities enabled by digital technologies, firms can shape a new value proposition and orientation supported by decision-makers (Westerman et al., 2011; Bharadwaj et al., 2013; Pagani, 2013; Kane et al., 2015; Matt et al., 2015; Ross et al., 2016; Sebastian et al., 2017). Therefore, as the literature assumes a relationship between digitalization and managerial decisions, we developed our baseline hypothesis to examine the effect of the degree of digitalization on the EO of MSMEs.

Hypothesis 1: *A high degree of digitalization contributes positively to an increase in the degree of EO in MSMEs.*

We were interested in investigating the extent to which the use of digital technologies could be a source of opportunities for internationalizing MSMEs. Thus, as we assumed that the implementation of such techniques supports their EO, we then intended to observe how EO is related to the internationalization intensity of the MSMEs surveyed. To evaluate and identify the internationalization intensity of firms, the literature suggests different measures and determining factors (Oviatt & McDougall, 1994; Jones & Coviello, 2005; Ruzzier et al., 2006). The most frequently used measures underpinning internationalization intensity consist of four main indicators, including the scale (share of turnover from foreign markets), the scope (geographical market involved), the speed (rate at which revenues are generated), and the mode (market entry for cross-border activities) (Oviatt & McDougall, 1994; Zahra & George, 2002; Jones & Coviello, 2005; Ruzzier et al., 2006; Kuivalainen et al., 2007; Brouthers & Hennart, 2007; Andersson et al., 2014). As reflected in the relevant literature, an entrepreneur's experience and their global mindset are prerequisites for successful internationalization in terms of increased intensity. Therefore, our next hypothesis indicates that we expected greater EO to be associated with internationalization intensity among MSMEs.

Hypothesis 2: *A high degree of EO contributes positively to an increase in a) the scale, b) the scope, c) the speed, and d) and the mode of internationalizing MSMEs.*

The proposed research framework and the formulated hypotheses are highlighted in Figure 1. This representation shows a conceptual process in which the degree of digitalization supports EO, and in turn, affects the internationalization intensity of MSMEs.

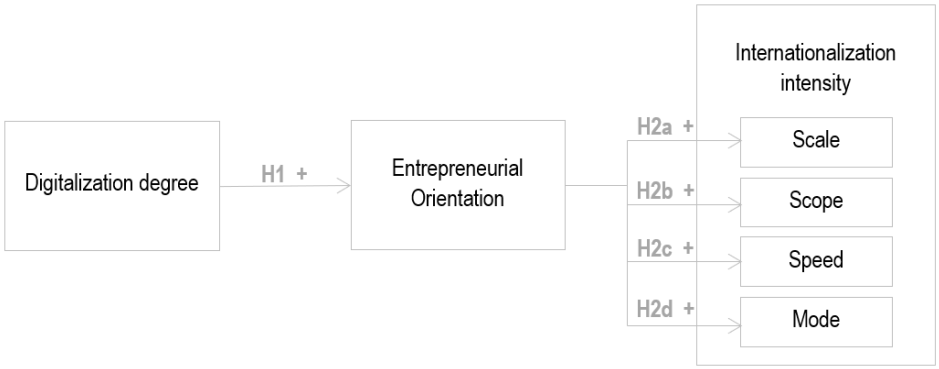


Figure 1. Research framework

3.4 METHODOLOGY

3.4.1 Sample and data collection

To gather empirical evidence, our study relied on a quantitative research design. Based on the key determinants of DE, EO, and IE compiled from literature, the quantitative approach took stock of the Swiss context. Highly involved on the international stage and given its cultural and language diversity, Switzerland is a good representative of internationalizing firms. Approximately 99% of companies are MSMEs, which account for more than two thirds (67.6%) of total business employment (FSO, 2019). This high proportion demonstrates the major role MSMEs play in the Swiss economy. Approximately 9% of the 586,2147 companies registered in Switzerland export goods every year (FCA, 2019), representing around 40,000 MSMEs. These firms make a significant contribution to the total export of Swiss goods, with an overall share amounting to 45% (FSO, 2019). Although Switzerland is resource poor, it is nonetheless highly competent in basic and innovative technologies (GDS, 2018), thus comprising an interesting setting with respect to digitalization. We tested our hypotheses using a secondary database from Swiss internationalizing MSMEs (Baldegger et al., 2019). Maintaining the relative weight of each category, 8,000 firms were randomly selected and surveyed; hence including almost 20% of the total exporting Swiss MSMEs. To ensure homogeneity in our sample and because we were interested in MSMEs, we excluded firms with more than 250 employees. Moreover, we only took into consideration firms that generate more than 5% of their annual sales revenue in foreign markets. Our final sample comprised 190 MSMEs that met our inclusion criteria. On average, respondents have been selling and trading in foreign markets for more than 30 years and generate around 55% of their total revenue abroad. The selected MSMEs taken into consideration have on average 60 employees and come mainly from manufacturing and professional services.

3.4.2 Measures

Within our database, we focused on specific measurements that were validated in existing literature, and thus relied on three key variables in the empirical analysis: degree of digitalization, entrepreneurial orientation and internationalization intensity.

3.4.2.1 Degree of digitalization

The variable degree of digitalization consists of a four-item scale related to various strategic pillars of companies (Greif et al., 2017). Based on a self-evaluation, companies were asked to assess the level of digitalization of each item using a score range of 1 to 4. The four items are divided into two internal pillars – processes and infrastructure, as well as people and culture, and two external pillars – digital sales and customer involvement. To measure each dimension as comprehensively as possible, respondents were asked to scale their degree of digitalization on the basis of four statements that helped firms to position themselves on a score ranging from 1 to 4. The higher the score of the selected statements, the higher the degree of digitalization.

3.4.2.2 Entrepreneurial orientation

To measure the EO of our sample, we used the questionnaire developed by Colvin and Slevin (1989). It consists of nine items consolidated under three unidimensional strategic orientations: innovativeness, proactiveness, and risk-taking. Managers for our survey were asked to indicate the extent to which each item reflects their strategic posture on a seven-point Likert scale that divided pairs of opposite statements. The higher its overall score, the more entrepreneurial the company's strategic posture (Covin & Slevin, 1989; Lumpkin & Dess; 1996).

3.4.2.3 Internationalization intensity

To articulate the intensity of internationalization, we focused on four factors: the scale, scope, speed and mode of internationalization. Firstly, we measured the scale indicator with the percentage of sales derived from foreign market activities to total firm sales revenue (Oviatt & McDougall; 1994; Zahra & George, 2002; Knight & Cavusgil, 2004; Kuivalainen et al., 2007). Secondly, we explored the market scope in line with the literature, and measured it according to the number of geographical markets with which MSMEs are involved and have generated revenue (Zahra & George, 2002; Jones & Coviello, 2005; Kuivalainen et al., 2007; Andersson et al., 2014). Thirdly, we considered the speed of internationalization. Because there is no established conceptualization or measurement tradition for this variable, we refer it to the current ratio of foreign sales to total sales in relation to the number of years involved abroad (Jones & Coviello, 2005; Oviatt & McDougall, 2005; Kuivalainen et al., 2007; Andersson et al., 2014; Ziyae et al., 2014). Finally, the mode of internationalization was considered according to the particular combination of entry strategies applied by the MSMEs surveyed. Several alternatives of entry mode have been addressed in the literature and we have selected the main ones, including direct exports, indirect exports, e-commerce, licensing and franchising, joint venture, and

subsidiaries (Datta et al., 2002; Malhotra et al., 2003; Jones & Coviello, 2005; Brouthers & Hennart, 2007; Hashai et al., 2010; Andersson et al., 2014).

3.5 RESULTS

In this study, special care was taken to ensure the validity and reliability of our measurements. Thus, to determine the adequacy of our measurement model we first investigated the internal consistency of the measured constructs through a reliability analysis. Results show a variable degree of digitalization and EO Cronbach Alpha values of more than 0.7, which is higher than expected by Hair and colleagues (2006). However, the variable of internationalization intensity has a Cronbach Alpha value of 0.401. Thus, instead of constructing a composite variable, as was the case for digitalization and EO, we did not create a mean score for internationalization intensity, but rather used single items of measurement. Finally, in our research, we also created composite variables consolidating the 9 items of EO under the three unidimensional constructs; innovativeness, proactiveness, and risk-taking (Covin & Miller, 2014). Table 1 introduces a description of the constructs and displays the results of the reliability analysis involving key variables.

In order to test our hypotheses and evaluate the relations between variables, we statistically relied on a regression analysis. On the one hand, we investigated the relationships that may exist between degree of digitalization and degree of EO for MSMEs, while, on the other, the relationships between decomposed EO factors and the internationalization intensity of MSMEs.

3.5.1 Hypothesis 1: Degree of digitalization and EO

As a first step, a regression was calculated to predict the degree of EO based on the degree of MSMEs' digitalization. The regression results revealed that a company's degree of digitalization is positively and significantly related to its degree of EO (ß=.402; $p<0.001$). This allowed us to validate our first hypothesis (H1). Since we were not interested solely in the general hypothesis that considers the average degree of digitalization, we operationalized based on four specific hypotheses to detail the results. In short, we considered it more significant to decompose EO factors in detail, and thus aimed to further deconstruct the process proposed in our research model by analyzing how the degree of digitalization of each pillar affects each EO component. In order to test these contributions, we subdivided three separate regression models. The first was calculated to predict EO innovativeness based on the degree of digitalization of each pillar. Results show that EO components are mainly affected by the degree of digitalization of the internal pillars. The relationship between digitalization of the firm's pillars and innovativeness highlights a positive effect of process and infrastructure (ß=.344; p=0.000) as well as people and culture (ß=.308; p=0.001). The second model investigated the construct of proactiveness. A similar pattern of results was found with the pillar process and infrastructure (ß=.318; p=0.003) as well as people and culture (ß=.311; p=0.002). We then calculated the last model with the risk-taking factor

and found a tendential positive result with the pillar process and infrastructure (ß=.183; p=0.091), as well as a positive relationship with people and culture (ß=.306; p=0.004).

3.5.2 Hypothesis 2: EO and the intensity of internationalization

Regarding our second hypothesis, we also decided to use decomposed EO factors in order to provide a more relevant analysis, as well as to observe in more detail how innovativeness, proactiveness, and risk-taking affect the propensity of MSMEs' internationalization. The regression results highlighted that not all components of EO are significant predictors of MSMEs' internationalization, and revealed that none of the EO factors are a driver of scale and mode. Notwithstanding these first observations, the regression analysis for scope indicated a positive and significant relationship with proactiveness (ß=.270; p=0.010) (H2b is supported). Finally, regarding the regression analysis for speed, we noticed a positive and significant relationship with risk-taking (ß=.270; p=0.039) (H2c is supported).

Table 1. Descriptive statistics.

		Mean	Median	Minimum - Maximum	Standard deviation	Number items	Alpha value
Degree of Digitalization		2.15	2.00	1.00 – 4.00	0.723	4	.719
● Process and infrastructures		2.35	2.00	1.00 – 4.00	0.940	1	-
● People and culture		2.43	2.00	1.00 – 4.00	0.855	1	-
● Digital sales		1.64	1.00	1.00 – 4.00	0.863	1	-
● Customer involvement		1.92	1.00	1.00 – 4.00	1.072	1	-
Degree of EO		4.33	4.55	1.00 – 7.00	1.093	9	.828
● Innovativeness		4.27	4.33	1.00 – 7.00	1.353	3	.678
● Proactiveness		4.51	4.66	1.00 – 7.00	1.258	3	.664
● Risk-taking		4.28	4.33	1.00 – 7.00	1.229	3	.845
Internationalization intensity	● Scale	55.47	62.00	5.00 – 100.00	34.822	1	.401
	● Scope	19.90	11.00	0 – 193	25.526	1	
	● Speed	3.68	2.08	0.18 – 30.00	5.022	1	
	● Mode	1.95	2.00	1.00 – 6.00	1.082	1	

3.6 DISCUSSION

This study was conducted with the objective of shedding light on relationships that link the dimensions of digitalization, EO, and internationalization of MSMEs. Although our results support the well-founded views from existing theoretical frameworks, the investigation of these dimensions within one process extend beyond conventional views that have only examined them separately. The central contribution of our study includes the introduction of a conceptual process that demonstrates how digitalization affects EO which, in turn, is a crucial determinant for increasing the internationalization propensity of MSMEs. As predicted, we found that the more MSMEs have digitalized some of their operations, the more they favor entrepreneurial behavior when leading their strategic decisions. Furthermore, in line with scholarly research, we verified that the more entrepreneurial behavior a company adopts in its foreign operations, the more it increases its internationalization intensity. More specifically, we observed that the number of geographical markets expands through proactive behavior and the speed of generating revenue in those markets accelerates through taking risky actions. Contrary to expectations, we found no relationship between EO components and the scale and mode of MSMEs' internationalization.

By elaborating on the results of our hypothesis testing, we first noticed that firms prioritize a digital transformation in their internal processes and infrastructure, as well as in building their employees' digital skills and digital-oriented culture. Nevertheless, MSMEs demonstrated fewer digitalization efforts in terms of the experience they provide through sales and customer involvement. Indeed, in line with previous research, the use of purely digital technologies in external features leads to defining a new value proposition, and in some cases, requires redesigning the company's business model (Bharadwaj et al., 2013; Pagani, 2013; Gray & Rumpe, 2015; Kane et al., 2015; Porter & Heppelmann, 2015; Ross et al., 2016; Schallmo et al., 2017; Sebastian et al., 2017; Autio et al., 2018; Aagaard et al., 2019; Kraus et al., 2019). Established MSMEs may require more time and resources to achieve such digital transformation, and may consequently focus on digitalizing internal features for operation optimization, cost reduction, quality improvement, and greater reliability (Ross et al., 2016). At the same time, whether at internal or external levels, we observed in our results that the degree of digitalization has a significant impact on a company's EO, which, in turn, affects the internationalization intensity of MSMEs. The approach used in our research allows us to discuss the model of discovery and exploitation of opportunities through the use of purely digital technologies, particularly dedicated to established MSMEs.

Considering that we decided it was more relevant to observe the three unidimensional strategic orientations in our research separately, we propose organizing our discussion through each EO component. We first noticed a positive and significant relationship between the degree of digitalization and innovation behavior. Thus, from the perspective of innovativeness, we found that the digital context enables firms to strongly encourage collaboration, sharing of ideas, and new value creation. As emerging technologies have the ability to connect people to each other, connect people

with machines, and connect machines to each other, broad business networks and communities are created around the world. And since digital technologies are interactive technologies, a flow of hyperconnectivity allows firms to improve their innovativeness by integrating new actors – customers, staff, partners, and even competitors – into their creative processes and experimentations. For instance, as the dimensions of space and time are changing, customers have become directly reachable through digital platforms, regardless of distance and time zones. People can therefore be integrated remotely into the process of designing, sharing ideas and experimenting.

Even if we did not find a significant relationship between innovative behavior and internationalization items, we are convinced that the benefits of digitalization can better enhance company innovativeness. New forms of collaboration involving innovation, co-creation, and strategic alliances will provide companies with additional resources and competences to develop international trade activities and better adapt offers to foreign market expectations. To achieve this, technologies, such as digital platforms, mobile applications, augmented reality, and 3D printers present innovative ways to personalize offers, build unique experiences with end-users, and even start activating nearby customers.

To build and fuel the wide range of digital technologies, the central point is the data (Witten et al., 2016). From a perspective of proactiveness, data is also a precious source of information for firms to improve their competitive position. In our research, we found a positive relationship between the degree of digitalization and the proactiveness of firms. We are convinced that data exists as a crucial resource for decision making. By collecting abundant data and processing it through predictive algorithms, firms can assess their current conditions, as well as future market attractiveness, and thereby improve their competitive position (Neubert, 2018). Available data can also be employed for the development of user-centric and knowledge-driven products and services. This is also a way to increase customization. Nowadays, while collecting data is a method for overcoming a lack of business knowledge, monitoring it is essential for shaping a company's environment, and adapting its strategic behavior. With technological advances, such as big data, internet of things, and machine-learning, firms are improving their abilities to gather market knowledge and taking a more proactive stance in their decision-making process. Better informed companies are more inclined to take dynamic actions to extend their product or service scope in foreign markets and to engage in new niche markets. For example, they can experiment using several test versions directly on customers, who are able to give their opinions and feedback, or to share data on preferences and habits.

We are convinced that using digital technologies is a relevant method of overcoming international barriers by pursuing new market commitments, even without the certainty of success. Risk taking is thus the last entrepreneurial orientation that we found positively affected by the use of digital technologies. We suggest that if companies are better informed, they should be more inclined to make decisions that involve taking calculated risks. Despite the fact that entrepreneurs are often afraid of cyber-attacks, data loss, and other security issues involved in digital technology usage, we are nevertheless confident that these tools will develop more secure solutions in the years to come. For example,

companies can use blockchain technology to secure financial and other business transactions. An open, distributed ledger can record transactions between two parties efficiently, in a verifiable and permanent way (Iansiti & Lakhani, 2017). This makes blockchain part of a sharing process between actors who must collaborate, even while they do not naturally trust each other. Mechanisms based on cryptography make the registry tamper-proof and the transactions immutable. From our results, we also demonstrated a positive relationship between risk taking and the speed of MSMEs' internationalization. In our argument, we suggested that, by implying more direct and greater integration of data between actors, digital technologies increase immediacy, moderate the need for intermediaries, and consequently, speed up the pace of exchanges. In some cases, disintermediation may also result in reducing companies' dependence on location-specific value chain assets and resources.

In the light of these notable findings, we finally suggest that entrepreneurs should combine digitalization, EO, and internationalization activities through defining their own digital entrepreneurial internationalization strategy. Shaped by combining current capabilities with capabilities enabled by digital technologies, a new business strategy will directly impact the current value proposition of companies in foreign markets, and thus significantly reinforce their competitive advantage. According to the change in governance involved in digital contexts, we emphasize the key role of founders and decision-makers. We are convinced that the faster they understand the benefits of using digital technologies with a specific vision in mind, the faster they will develop the right mindset to achieve their transformation and increase their internationalization.

3.7 CONCLUSION

In this study, we conjointly examined three research streams from the field of entrepreneurship. The central contributions of our research include the introduction of a conceptual process that illustrates the relationships between degree of digitalization, EO, and the internationalization intensity of MSMEs. It highlights how the degree of digital transformation affects companies' EO, and measures how each EO component is linked to MSMEs' internationalization intensity. We relied on a quantitative research design based on Swiss internationalizing MSMEs, and statistically demonstrated that as firms become digitalized, this positively affects their EO degree which, in turn, positively contributes to increasing the scope and speed of their internationalization. Furthermore, to reinforce the results of our study, we discussed propositions that highlight how digital technologies could improve companies' EO, and thus enhance internationalization. In our argument, we considered that the digital context provides a wide range of opportunities for firms to become more innovative, aggressive and risk-taking in order to conquer new foreign markets. Indeed, by shaping spatial and temporal boundaries of entrepreneurial activities, digital technologies reduce many constraints for reaching the global marketplace. By consolidating EO capabilities with the use of nascent technologies, we suggested that firms have numerous opportunities to further activate their ecosystem, deepen market knowledge, develop stronger skills, optimize internal resources and better exploit external ones, improve operations, and shape

new value propositions with greater flexibility and responsiveness. All of these elements, if dynamically explored, will lead companies to expand their competitive advantage in foreign markets.

3.8 IMPLICATIONS, LIMITATIONS AND FURTHER RESEARCH

Although DE, EO, and IE have been widely addressed in scientific research, the value added from our research is in considering these dimensions as part of the same process. By testing a set of hypotheses, the study contributes to empirically confirming the relationship between digitalization and EO, as well as between EO and MSMEs' internationalization. We also made an important contribution to knowledge by outlining empirical evidence measuring the degree of companies' digitalization and by emphasizing how founders can benefit from the decentralization of governance to exploit new opportunities. However, even though we have suggested that digitalization in internal dimensions involves less financial risk and effort in the short term, it would be relevant to examine in more detail how firms can transform their external dimensions and redesign their value proposition in light of digitalization. Because our empirical results were collected via Swiss MSMEs, this may raise concerns about the possibility of generalizing the results to other nations. To develop the conceptual process, we encourage further research to collect empirical evidence in other countries. Furthermore, in our research, no composite variable could be created based on the internationalization items. It would therefore be interesting, in a future study, to create a multidimensional construct of internationalization and observe how it is related to EO.

4 CHAPTER – ARTICLE #3

Degree of digitalization and entrepreneurial orientation of internationalizing micro-, small- and medium-sized enterprises: the mediating roles of self-concept traits

4.1 ABSTRACT

Addressing associations among digital entrepreneurship (DE), entrepreneurial orientation (EO) and self-concept traits, this paper proposed to examine relationships among the key dimensions of firms' digitalization, strategic posture and entrepreneurial behaviors using survey data from internationalizing micro-, small- and medium-sized enterprises (MSMEs). Based on parallel mediation analysis, the study tested the direct and indirect effects of the degree of digitalization on the unidimensional construct of EO and explored how the self-concept traits of self-efficacy and locus of control – operationalized to reflect entrepreneurial behaviors – mediate this relationship. The results indicated that the degree of digitalization of MSMEs is positively related to EO and that self-efficacy plays a mediating role in this relationship. Locus of control, on the other hand, has no effect. Theoretical contribution and practical implications of the findings are discussed and insights for future research are suggested.

4.2 INTRODUCTION

Although the widespread adoption of digital technologies creates an enabling business environment based on wide scalability and powerful resources for processing and storing information, the digital context also accentuates the competitive landscape all around the world. As it shapes spatial and temporal boundaries of entrepreneurial processes and outcomes (Nambisan, 2017), digital technologies reduce many barriers as regards reaching the global marketplace. This context allows new players to compete and completely transforms the patterns of both domestic and international trade. In such a competitive environment, micro-, small- and medium-sized enterprises (MSMEs), and especially internationalizing ones, are required to adjust their efforts by aggressively trying to preserve a market advantage and demonstrate a strong entrepreneurial orientation (EO) (Covin and Slevin, 1989). EO refers to strategic behaviors that are entrepreneurial in nature, in other words, it consists of decision-making practices that demonstrate innovativeness, proactiveness and risk-taking (Anderson et al., 2009). In that regard, by allowing more variability in entrepreneurial activities and in value creation, integrating digital technologies into internal and external firms' operational dimensions might offer new opportunities, not only for building strong competitive advantage, but also for optimizing managerial and strategic decisions (Hull et al., 2007; Bharadwaj et al., 2013; Nambisan, 2017; Autio et al., 2018; Kraus et al., 2019). At a firm level, digital technologies are a major type of external enabler that have a paradigm-shifting role in entrepreneurship (Davidsson, 2015; Nambisan, 2017; von Briel et al., 2018). They have rendered entrepreneurial

activities less bounded and have decentralized and distributed firm governance between groups of actors, thereby enabling innovation collectives and the sharing of value creation (Nambisan, 2017). However, even if the change in competitive and technology landscapes creates entrepreneurial opportunities to be discovered and pursued by entrepreneurs (Schumpeter, 1934; Shane, 2000; Kor et al., 2007), those individuals need to be aware of these new possibilities in order to reinforce the entrepreneurial behaviors of their firms and be ready for sustainable innovations (Shane, 2000; Kraus et al., 2019). As acknowledged by Schumpeter (1934), it is individual characteristics that influence the discovery and exploitation of opportunity - and thus, personal traits. Prior knowledge, as well as technology and managerial capabilities are also required (Shane, 2000; Grégoire and Shepherd, 2012; Gruber et al., 2012). In the literature, despite the burgeoning scholarly interest in the digital area, a number of ontological questions persist. Indeed, minimal research has addressed the role of digital technologies in shaping entrepreneurial opportunities, decisions, actions and outcomes (Nambisan, 2017).

Within the entrepreneurship domain, particularly in a context of rapid technological advances, many researchers have been interested in profiling the specific characteristics that define the entrepreneur and his entrepreneurial actions (Schumpeter, 1934; Shane, 2000; Kor et al., 2007; Rauch and Frese, 2007; Gruber et al., 2012). As self-motivated individuals, entrepreneurs rely primarily on themselves to achieve their goals and thus, are a central driver in taking advantage of technological changes and defining competitive strategies (Schumpeter, 1934). Similarly, recurrent debates in scientific literature associated the personal traits of managers with a firm's EO (Miller and Friesen, 1982; Miller, 1983; Mueller and Thomas, 2001; Poon et al., 2006; Khedhaouria et al., 2015; McGee and Peterson, 2019). As contended in the Miller and Friesen (1982) study, executive goals and traits are central to driving a firm's EO. At the individual level, there are many self-concept traits that have a theoretical relationship with a firm's strategic posture. The most popular concepts in the field of entrepreneurship are self-efficacy, which refers to individuals' perceived ability to accomplish a certain level of performance (Bandura, 1986) and locus of control, which refers to the disposition of a manager to perceive control over the environment (Rotter, 1966). In our research, we suggested that entrepreneurs have several opportunities to maintain their firms' competitive and entrepreneurial strategic posture by reinforcing EO capabilities with the use of digital technologies. Nevertheless, in the literature, few empirical studies have explored these dimensions together in order to understand how the integration of digital technologies into firms may drive EO. In our research, we thus extended the theoretical boundary and contributed to the entrepreneurship literature by testing a comprehensive model that used both firm-level and individual-level variables to explain the EO of MSMEs. Specifically, drawing on digital and technology entrepreneurship, on EO and the theories of self-concept traits, we argued that the integration of digital technologies into internal and external dimensions of a firm is central to reinforcing the strategic posture of entrepreneurially internationalizing MSMEs and proposed that individuals are the central driver of this strategic approach. In sum, we aimed to investigate the effect of the digitalization of MSMEs on their EO as well as examine the role of individuals' behaviors as potential mediating variables to explain this relationship. Toward these

ends, we developed a model linking four levels of digital transformation (i.e., process and infrastructure – people and culture – digital sales – customer involvement) to the three main EO components (i.e., innovativeness – proactiveness – risk-taking) and measured how the relationship transits through self-concept traits (i.e., self-efficacy and locus of control). Based on parallel mediation analysis, the model was empirically tested using 143 Swiss internationalizing MSMEs. Our study made two distinct contributions to theory on entrepreneurship. First, by using an integrative perspective, it provided new impetus to research on the effect on the firms' EO of integrating digital technologies into operational dimensions. Second, our research shed new light on the important role of individuals in shaping these digital opportunities to reinforce strategic posture. By providing empirical evidence of the mediating role of individual behaviors, we demonstrated that self-efficacy can be a way forward to strategically use digital technologies to reinforce EO and, simultaneously, to provide competitive advantage of internationalizing firms.

4.3 THEORY, HYPOTHESES AND RESEARCH FRAMEWORK

4.3.1 Digital Entrepreneurship

Firms are evolving at the heart of digital disruption that involves changes in the competitive landscape. Resulting from the use of digital technologies by new market entrants or existing competitors, these changes directly impact current offers and market strategic approaches of established firms (Ross et al., 2016). Simultaneously, the use of emerging and readily accessible technologies presents firms with opportunities to define new value propositions based on the combination of existing competencies and the capabilities allowed by technologies. This is especially true for MSMEs, which move more quickly (Ross et al., 2016). These emerging technologies have an increasing paradigm-shifting role in entrepreneurship and engender profound effects in shaping entrepreneurial processes, outcomes and opportunities (Nambisan, 2017). Because they create more fluidity and nonlinearity across time and space, the use of digital technologies has completely reshaped the very nature of entrepreneurship (Nambisan, 2017). From this perspective, the use of digital technologies can be introduced as input for entrepreneurship opportunities (Giones and Brem, 2017). In scientific research, the phenomenon of digitalization is of growing interest to more and more scientists and gave birth to DE a decade ago (Hull et al., 2007; Davidson and Vaast, 2010; Hair et al., 2012; Giones and Brem, 2017; Nambisan, 2017; Hsieh and Wu, 2019; Kraus et al., 2019; Recker and von Briel, 2019). At the intersection of digitalization and entrepreneurship theories, DE is described as a subcategory of entrepreneurship "*in which some or all of what would be physical in a traditional organization has been digitized*" (Hull et al., 2007). In other words, it is the association of traditional entrepreneurship with the new approach of creating value and doing business in a digital context. Considering the strong emergence of digital technologies in various aspects of innovation and entrepreneurship, DE can be defined as "*the pursuit of opportunities based on the use of digital media and other information and communication technologies*" (Davidson and Vaast, 2010).

Although DE entrepreneurship is gaining increasing importance in the scholarly community, the field is still struggling to provide a consolidated definition (Kraus et al., 2019). Furthermore, even if the research field is of high topically, literature on the topic is quite scarce (Kraus et al., 2019). Limited efforts have been made in theorizing opportunities, challenges and success factors of DE and researchers have overlooked the role of digital technologies in entrepreneurial activities (Nambisan, 2017; Kraus et al., 2019). By combining insights from the fields of entrepreneurship and DE, our paper highlighted several insights into the major role of the use of digital technologies in adopting strategic orientations, both at the corporate and at the individual levels.

4.3.2 At the firm level – Entrepreneurial orientation in a digital context

As reported by Porter (1985), technological change represents one of the main drivers of competition and significantly affects competitive advantage of firms. Consequently, as highlighted by Covin and Slevin (1989), in such a competitive environment, companies need to adapt their efforts to current conditions by aggressively trying to benefit from or preserve their market advantage. In order to access such an advantage, entrepreneurial firms would have to build and adopt an EO as their strategic posture (Covin and Slevin, 1989; Lumpkin and Dess, 1996; Anderson et al., 2009; Rauch et al., 2009). This orientation has generally been conceptualized as an organizational trend in decision-making that favors entrepreneurial activities (Lumpkin and Dess, 1996; Anderson et al., 2009). To identify this trend, Covin and Slevin (1989, 1991) defined a continuum ranging from a more conservative posture to a more entrepreneurial one. In this regard, EO is the ability to adopt new behaviors in order to manage future changes in the external environment and the propensity to engage in investments with uncertain returns (Covin and Slevin, 1989; Lumpkin and Dess, 1996). In scientific literature, researchers have suggested that EO is a capacity that provides the main abilities for consolidating competitive advantage (Covin and Slevin, 1989; Lumpkin and Dess, 1996). Since EO is based on this potential source of competitive edge, entrepreneurship researchers agreed that firms with a high level of EO perform better than other firms (Wiklund, 1999; Krauss et al., 2005; Anderson et al., 2009; Li et al., 2009; Rauch et al., 2009). Alongside the literature, EO has been discussed from a primarily firm-level perspective (Covin and Slevin, 1991; Lumpkin and Dess, 1996; Wiklund, 1999; Li et al., 2009; Anderson et al., 2015). Some authors have nonetheless contended that there is no entrepreneurship without the entrepreneur and have adopted EO as an individual-level process by using a personal traits and behavioral approach (Krauss et al., 2005; Poon et al., 2006; Rauch et al., 2009; Khedhaouria et al., 2015). In our study, we have considered EO to be a firm-level concept and took into consideration founders and decision-makers as a lever of influence to operationalize the orientation of strategic decisions (Covin and Slevin, 1991). As Miller (1983) suggested, the firm's degree of entrepreneurship could be characterized by the proclivity of a firm to value innovative, proactive and risk-taking actions. In other words, adopting an EO as a strategic posture is demonstrative of innovative, proactive and risk-taking efforts to better recognize and exploit opportunities as well as outperform competitors (Miller, 1983). Thus, the most common conceptualization of EO is based on a unidimensional strategic orientation towards

three components: *innovativeness*, which represents the firm's ability and willingness to encourage novel and creative processes, new insights and experimentation for launching new products and services: *proactiveness*, which describes the propensity of a company to identify and pursue opportunity for improving competitive situations, anticipate change and shape the business environment: and *risk-taking*, which refers to the uncertainty that follows when an entrepreneur or a firm behaves entrepreneurially and engages in risky actions (Covin and Slevin, 1989; Lumpkin and Dess, 1996). By providing the main abilities for consolidating competitive advantage in markets, the concept of EO is often applied in the research stream of international entrepreneurship (IE) (McDougall and Oviatt, 2000). In the literature, academic researchers have even developed the multi-dimensional concept of international entrepreneurial orientation (IEO) that refers to the willingness of entrepreneurs in demonstrating innovativeness, proactiveness and risk-taking in international trade (Covin and Miller, 2014).

As introduced at the beginning, strategic entrepreneurship researchers exploring technological change have advocated from the outset that technological capabilities are paramount in the process of gaining competitive advantage and improving business performance (Porter, 1985; Neo, 1988; Powell and Dent-Micallef, 1997). Today, with the advances in digital technologies, the basis of competitive advantage is being significantly transformed. The use of digital tools allows firms to think differently about business and to expand the possible approaches in solving problems (Weinman and Euchner, 2015). As Grégoire and Shepherd (2012) suggested, *an opportunity is neither solely about a new technology nor solely about a current market situation; rather, it is about the possibility of changing the current market situation by using the new technology*. Based on wide scalability and powerful resources for processing and storing information, digital technologies favor an enabling business environment for MSMEs and allow firms to overcome several issues, such as the way to deal with uncertainty in entrepreneurial activities (Nambisan, 2017). At the firm level, the unique attributes of digital technologies have affected the fundamental character of corporate strategic orientation and is providing more variability in entrepreneurial activities, especially for internationalizing MSMEs. As outlined by Nambisan (2017), the digital context has reshaped two major assumptions of entrepreneurial processes and outcomes. First, digital technologies have rendered entrepreneurial processes and outcomes less bounded and allow more flexibility and continuous improvement in activities. Second, by involving a more diverse set of actors in activities, the digital context leads to more collective ways of undertaking entrepreneurship in order to bring together new ideas and resources. Furthermore, as the structural connections of digital technologies make them interactive, it also leads to the creation of digital affordances that improve existing functions or perform entirely new ones (Autio, 2017; von Briel et al., 2018). Thus, it provides opportunities, especially for established MSMEs, to proactively deliver and capture value in the interactions with their entire ecosystem, including customers, partners, suppliers and stakeholders (Autio, 2017). Whether to develop and customize offers or optimize processes, involve new actors, improve managerial decisions and rethink current business models, the use of digital technologies triggers a transformation in firms' activities (Bharadwaj et al., 2013; Matt et al., 2015; Porter and Heppelmann, 2015; Ross et al., 2016; Schallmo et al., 2017; Autio et al., 2018;

Kraus et al., 2019). These transformations are occurring at both the internal and external dimensions of firms. Indeed, innovation through digital technologies not only applies to products and services, but also extends to organizational dimensions related to infrastructure, processes, human capital, as well as customer relationships (Weinman and Euchner, 2015). In that regard, the use of emerging technologies might offer new opportunities to adopt strategic behavior and develop entrepreneurial activities through more innovativeness, proactiveness and risk-taking. However, as outlined by Nambisan (2017), scientific research has neglected to theorize their role in shaping entrepreneurial opportunities, decisions, actions and outcomes. Based on the insights of prior studies, we expected the use of digital technologies in external and internal dimensions of firms to provide new competencies and resources for consolidating strategic orientation and, thus, positively affect the EO of MSMEs. Thus, we developed the first hypothesis:

Hypothesis 1: *The degree of digitalization of MSMEs is positively associated with their EO*

4.3.3 At the individual level – Entrepreneurial self-concept traits in a digital context

Within the entrepreneurship domain, particularly in a context of rapid technological advances, many researchers have been interested in profiling the specific characteristics that define the entrepreneur and her/his entrepreneurial actions (Schumpeter, 1934; Shane, 2000; Kor et al., 2007; Rauch and Frese, 2007; Gruber et al., 2012). In his previous research, Schumpeter (1934) considered the entrepreneur a central driver to taking advantage of technological changes and defining competitive strategies. It has been acknowledged that the individual perceptions that shape entrepreneurial behaviors about what the firm can achieve with its technological resources are paramount to better explaining and predicting the growth options pursued by an entrepreneur (Gruber et al., 2012). Although technological change presents numerous possibilities to transform production, distribution, as well as organization processes, it does not generate obvious entrepreneurial opportunities that anyone can discover (Shane, 2000). It is individual characteristics that influence the discovery and exploitation of opportunity (Schumpeter, 1934) and, thus, personal traits, prior knowledge, technology and managerial capabilities are required (Shane, 2000; Grégoire and Shepherd, 2012; Gruber et al., 2012).

As outlined by Shane (2000), psychological research has developed theories in which entrepreneurship represents stable characteristics that are not accessible to everyone. Indeed, EO is motivated and driven by diverse personality traits that characterize the entrepreneur (Miller and Friesen, 1982). Following this perspective, numerous personal attributes, such as the need for achievement, the willingness to take risks, self-efficacy and locus of control are closely associated with entrepreneurial behavior and lead some people to pursue entrepreneurship (Shane, 2000). In other words, EO is perceived as resulting from certain drivers related to entrepreneurs' behavioral traits (Miller and Friesen, 1982). Thus, because we were interested in the role of individuals in the relationship between the degree of digitalization of firms and their EO, we investigated two of these human attributes; self-efficacy and locus of control. As many authors have studied the influence of these individual motivation concepts on strategic behavior of firms and have supported significant positive relationships between these dimensions (Miller, 1983; Boyd and Vozikis, 1994; Mueller and Thomas,

2001; Forbes, 2005; Zhao et al., 2005; Poon et al., 2006; Rauch and Frese, 2007; Khedhaouria et al., 2015; McGee and Peterson, 2019), we suggested a new perspective on these links in a context of digitalization.

4.3.3.1 Self-efficacy

In entrepreneurship research, there are many factors influencing one to become an entrepreneur. These factors are based mostly on combinations of personal attributes, such as traits, background, experience and disposition, (Gist, 1987; Wood and Bandura, 1989; Boyd and Vozikis, 1994; Chen et al., 1998). Self-efficacy is one of these personal attributes and is an important determinant of human behavior (Bandura, 1986; Boyd and Vozikis, 1994; Ajzen, 2002; Zhao et al., 2005; McGee et al., 2009). According to Bandura (1986), it refers to one's perceived ability to successfully reach a certain level of performance in various roles and tasks of entrepreneurship. More accurately, self-efficacy is defined as "*people's judgements of their capabilities to organize and execute courses of action required to attain designated types of performance*" (Bandura, 1986). In their research, Wood and Bandura (1989) offered a slightly different definition and described self-efficacy as "*beliefs in one's capabilities to mobilize the motivation, cognitive resources, and courses of action needed to meet given situational demands*". As it concerned people's beliefs in their capabilities to generate given attainments, this concept is distinguished from the skills one possesses and from outcome expectations. It is more reflective of what individuals believe they can do with those skills (Ajzen, 2002). Thus, because it influences an entrepreneur's choice of activities, aspirations, skill acquisition, goal levels, perseverance, performance and effectiveness, this motivational construct is a useful and dynamic approach that illustrates the process of evaluating and adopting entrepreneurial behavior (Boyd and Vozikis, 1994; Zhao et al., 2005). In the literature, researchers distinguished the concepts of general self-efficacy from that of entrepreneurial self-efficacy. General self-efficacy refers to an individual's confidence in successfully meeting the demands of a variety of tasks in a variety of situations, while entrepreneurial self-efficacy refers to an individual's belief in successfully performing the roles and tasks of an entrepreneur associated with new-venture management (Boyd and Vozikis, 1994; Chen et al., 1998; Forbes, 2005; McGee et al., 2009; McGee and Peterson, 2019). However, as entrepreneurial activity includes many potential tasks and associated skills, it has been acknowledged in scientific research that general self-efficacy is much easier to measure (McGee et al., 2009; Khedhaouria et al., 2015; McGee and Peterson, 2019). Thus, because it more closely reflects a consistent disposition, we used general self-efficacy in our study.

The efficacy belief system is not holistic, but rather consists of a differentiated set of personal beliefs related to distinct areas of functioning. The acquisition of self-efficacy differs according to each person's areas and activities (Bandura, 2006). It is developed gradually through experience and affects skills development as well as effort expenditure and level of persistence (Bandura, 1982; Gist, 1987). Mastery experiences and repeated performance accomplishments are effective ways to acquire a strong sense of self-efficacy (Gist, 1987, Wood and Bandura, 1989). It has been acknowledged in scientific research that the more deeply individuals believe in the effectiveness of their work and ability

to successfully accomplish any task or the more positive their perception that they can overcome the difficulties they encounter, the more they aim for ambitious goals and make a stronger commitment to achieving them (Wood and Bandura, 1989). Thus, individuals tend to be attracted to and to perform better in activities for which they have high self-efficacy. Inversely, they tend to avoid activities for which they have low self-efficacy (Bandura, 1982; Wood and Bandura, 1989; Boyd et al., 1994; Chen et al., 1998; Forbes, 2005; McGee and Peterson, 2019). To this end, because the infusion of digital technologies into a company's operational functions has refined the uncertainty in entrepreneurial processes and outcomes (Nambisan, 2017), entrepreneurs become more confident in their entrepreneurial activities. Hence, because they believe in their abilities and perceive themselves to be efficacious, entrepreneurs may be more likely to manage their business with entrepreneurial behaviors (Chen et al., 1998; Zhao et al., 2005) and would be more willing to encourage new innovative offers and experimentation, to act proactively on their environment and to engage in risky actions (Poon et al., 2006; Khedhaouria et al., 2015; McGee and Peterson, 2019). Given these findings, we developed the second hypothesis:

Hypothesis 2: *General self-efficacy mediates the relationship between the degree of digitalization and the EO of MSMEs*

4.3.3.2 Locus of control

As self-motivated individuals, entrepreneurs rely primarily on themselves to start a business and achieve their goals. Thus, many personal attributes are closely associated with entrepreneurial values and behavior, including the self-concept of locus of control (Mueller and Thomas, 2001). Developed in the field of psychology research by Rotter (1966), this construct is significant for measuring perceived control and defining its impacts on human behavior. Because self-efficacy differs greatly from perceived behavioral control, which is related to the capacity to perform a particular behavior (Ajzen, 2002), researchers in the field of entrepreneurship distinguish between the concepts of self-efficacy and locus of control (Boyd et al., 1994, Chen et al., 1998). First, even if these concepts are both cognitive and about control (Rotter, 1966; Ajzen, 2002), self-efficacy is task- and situation-specific, whereas locus of control is a generalized construct that includes a broader range of situations (Gist, 1987). For instance, an individual might have a strong locus of control in general, while demonstrating low self-efficacy in performing specific tasks at a specific level of expertise. Second, although both concern behavioral control, locus of control also measures outcome control (Rotter, 1966; Ajzen, 2002). Whether results are determined by one's own actions or by external factors, locus of control is concerned with belief about outcome contingencies and not with perceived capability (Bandura, 2006).

This belief-based personality variable is a relevant indicator of a small firm's performance and more specifically, represents the disposition of a manager to perceive control (Boyd et al., 1994; Ajzen, 2002; Wijbenga and Witteloostuijn, 2007). Based on his belief that behavior is learned through social interaction, Rotter (1966) built his insights on the role of reinforcement in determining behavior. According to his research, the outcome of an event can be perceived either

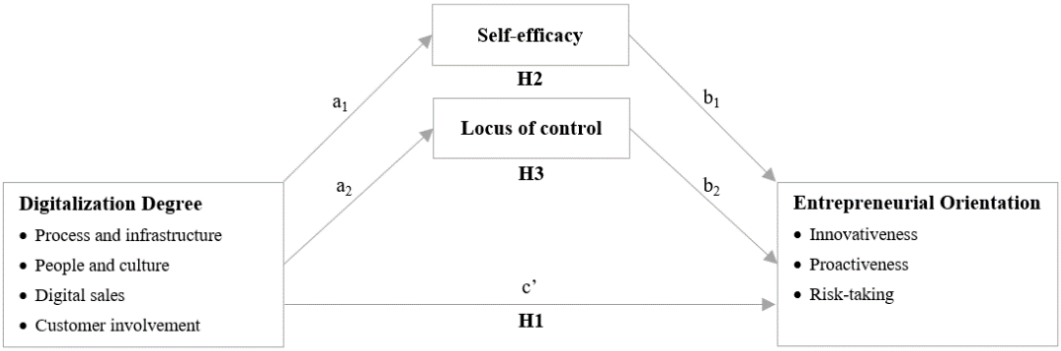
as contingent upon an individual's own behavior and under his or her personal control and understanding, or as being dependent upon external factors beyond their control and understanding. Consequently, Rotter (1966) distinguished between the internal locus of control – *the perception that rewards depend on an individual's own behavior*, and the external locus of control – *the perception that rewards depend on outside factors* (Boyd et al., 1994; Boone et al., 1996). In other words, individuals with an internal locus of control perceive that the reward is contingent upon their own behavior and believe they are able to control what happens in their lives, whereas individuals with an external locus of control tend to believe that most of the events in their lives are controlled and result from a chance occurrence. The personality trait of locus of control, especially the internal one, can be considered a prerequisite for action orientation and can be related to proactiveness and leadership (Boone et al., 1996; Mueller and Thomas, 2001). Accordingly, strategies are highly dependent on the level of perceived control. For instance, internal managers show more transformational leadership and are more task-oriented than external managers, who are more emotion-oriented (Boone et al., 1996). Scientists have thus made an association between entrepreneurial behavior and an internal locus of control orientation. Indeed, it has been widely acknowledged in scientific research that individuals who demonstrate a high level of perceived locus of control (internal) are more associated with entrepreneurial behavior and innovative strategies, while individuals with a low level of perceived locus of control (external) are mainly related to conservative behavior and low-cost strategies (Boone et al., 1996; Mueller and Thomas, 2001; Poon et al., 2006; Wijbenga and Witteloostuijn, 2007). In this regard, because digital technologies have refined the nature of uncertainties in entrepreneurial activities (Nambisan, 2017), entrepreneurs would be more inclined to believe that rewards depend on their own behavior. Consequently, they would be more willing to adopt entrepreneurial behavior to launch innovative ideas, to exploit new opportunities, to anticipate changes and to take risks (Miller, 1983; Mueller and Thomas, 2001; Poon et al., 2006). Based on these results, we developed the third following hypothesis:

Hypothesis 3*: Internal locus of control mediates the relationship between the degree of digitalization and the EO of MSMEs*

4.3.4 Research framework

As discussed, our proposed model aimed to test how individual behaviors – that is, general self-efficacy and internal locus of control – mediate the relationship between the degree of digitalization of MSMEs and their EO (Figure 1). We thus address the following model, which can be tested using parallel mediation analysis including more than one mediator (Hayes, 2013).

Figure 1. Research model.



4.4 METHODOLOGY

4.4.1 Sample and data collection

Our study is based on a quantitative research model that draws on empirical data collected from Swiss MSMEs active in foreign markets. One half of the sample is represented by manufacturing industries and the other half is adequately representative across other industries, including logistics, professional services, personal and consumer services, IT and communications, heath, as well as wholesale and retail businesses. Highly competitive in terms of innovation and strongly involved on the international stage, Switzerland is exemplary in meeting the objectives of our research. By possessing a competitive and high-level infrastructure of new technologies, the country is a driver of innovation and is a particularly interesting setting regarding digitalization. The use of digital technologies allows Swiss MSMEs and the country to remain both entrepreneurial and internationally competitive (GDS, 2018). Another interesting aspect for our study is that the majority of Swiss companies are MSMEs, representing almost 99% of the economic fabric. This large proportion constitutes a particularly diversified entrepreneurial universe of firms and highlights the country's strong entrepreneurial spirit.

The data were collected through a secondary database from 8'000 Swiss internationalizing MSMEs, randomly selected and surveyed. Because our study focused exclusively on high-level insights, we identified executive decision-makers and business founders to fill out the questionnaire. In addition, to ensure homogeneity in our sample, we took into consideration only the responses received from MSMEs reporting 250 or fewer employees, as well as firms that generated at least 5% of their total sales revenue in foreign markets. After removing responses with missing data or contradictory answers, our final sample includes 143 MSMEs that met our research criteria. The selected MSMEs averaged around 60 employees and generated more than 55% of their total revenue abroad. Respondents demonstrated a wealth of experience in terms of internationalization and have been trading in foreign markets for an average of 30 years. Furthermore, decision-makers in the respective firms are mainly men (95%), aged between 18 and 70 years (on average 40 years old), who demonstrate a strong entrepreneurial mindset.

4.4.2 Measures

In our research model, we relied on four constructs – two variables at the firm level and two variables at the individual level. The first one at the firm level is the *degree of digitalization*. This variable is based on a four-item scale reflecting the company's main strategic dimensions. As part of a digital transformation, firms integrate digital technologies at different levels and spheres of their organization. To differentiate them, we used key variables that include two internal pillars – process and infrastructure and people and culture - and two external ones – digital sales and customer involvement (Greif et al., 2017). Based on descriptive statements, the firms assessed the degree of digitalization of each pillar on a scale of 1 to 4. In interpreting the results, the higher the selected descriptive statement, the higher the degree of digitalization of the MSMEs surveyed. The second construct used in our study at the firm level is *EO*. Based on the questionnaire elaborated by Colvin and Slevin (1989), the measurement includes nine items consolidated under three unidimensional entrepreneurial orientations. The first three items are related to the firm's innovativeness, the second three assess their proactive behavior and the last three represent their propensity to undertake risky actions. Respondents were asked to evaluate the extent to which the items, formulated by pairs of opposite statements, reflect their firm's strategic posture and answers were recorded on a Likert scale that, in our case, ranges from 1 to 7. The results were interpreted as follows: the higher the total score, the more firms demonstrate entrepreneurial behavior in their strategic orientation (Covin and Wales, 2012; Covin and Slevin, 1989). The third construct, *self-efficacy*, refers to the individual and consists of items that articulate a personal position in relation to various skills and competences associated with the topic in question. As outlined by Bandura (2006), scales of self-efficacy have to be tailored according to the specific domain that is the object of interest. In our study, it was measured on the basis of a conceptual framework of task requirements (Chen et al., 1998; Zhao et al., 2005). On a seven-point Likert scale, managers were asked to indicate how confident they were in successfully *identifying new business opportunities, creating new products and services, managing innovation within a business, being a leader and communicator, building up a professional network, commercializing a new idea or development and successfully managing a business*. The higher the overall score, the higher the respondent's beliefs in her/his capabilities to generate given attainments. Finally, the fourth construct, *locus of control*, also refers to the individual and was assessed based on the Levenson's (1974) scale, which is an adaptation and refinement of the original construct I-E scale developed by Rotter (1966). Because we were interested in entrepreneurial behaviors of decision-makers, we used the internal control dimension of this belief-based personality variable. Items were written in Likert format, using a seven-point response scale (Sapp and Harrod, 1993). The higher the score, the higher the respondent's belief that outcome contingencies are determined by his or her own actions.

4.5 RESULTS

4.5.1 Descriptive statistics and construct reliability

In our study, the pattern of bivariate correlations reinforced our hypothesis of a parallel mediation between the variables tested (Hayes, 2013). Table 1 reports the means, standard deviations, reliability coefficient, and bivariate correlations between the variables of interest. As expected, the correlation between the level of digitalization and strategic orientation is positive and significant. The results also outlined a positive and significant correlation among the degree of digitalization and the two self-concept traits, as are the correlations between EO and self-efficacy and between EO and locus of control. The correlation between the two self-concept traits is relatively high and also demonstrates a positive and significant result. Moreover, to ensure the adequacy of our model's measurements, we assessed the composite reliability of each construct. Consequently, we conducted a reliability test to define the internal consistency of our measures and used Cronbach's Alpha to evaluate each construct. The major part of the composite reliability scores for measurement scales was above the suggested value of 0.70 (Hair et al., 2006) and ranged from 0.719 for the degree of digitalization, 0.828 for EO to 0.815 for self-efficacy, while the value for locus of control was slightly below, with 0.689. We thus included all of the components in our model.

Table 1. Analysis of the means, standard deviation, reliabilities and correlations of the variables.

Variables	Mean	Standard deviation	1	2	3	4
1. Degree of digitalization	2.14	0.72	(0.719)			
2. Entrepreneurial orientation	4.35	1.06	.441**	(0.828)		
3. Self-efficacy	5.52	0.90	.219**	.507**	(0.815)	
4. Locus of control	5.62	0.83	.170*	.286**	.647**	(0.689)

Note: values in parentheses are reliability coefficient (Cronbach's Alpha)

**statistical significance at the 0.05 level – ***statistical significance at the 0.01 level.*

4.5.2 Testing our hypotheses

In our study, we relied on parallel mediation analysis to test our hypotheses. As a more complex model than traditional mediation analysis, parallel mediation analysis includes more than one mediator to test the relationship between the independent and dependent variables (Hayes, 2013). There are as many indirect effects as there are mediators. According to Hayes (2013), these mediators are allowed to correlate with one another, but not to influence each other in causality. As we were interested in the mediating effects of individual behaviors in the relationship between the degree of digitalization and EO, we checked if any of the self-concept traits in question drive the mediation more than the others, or if both contribute to it.

Indeed, as we have no theoretical reason to assume that one dimension would lead to another, parallel mediation analysis is appropriate (Hayes, 2013). According to Baron and Kenny (1986), an empirical study with a classical mediation must follow a three-step approach and demonstrates (1) that there is a significant relationship between the independent variable and the mediating variable, (2) that there is a significant relationship between the independent variable and the dependent variable without including the mediator, and (3) that by incorporating the mediator, the relationship between the independent and the dependent variables is reduced and the relationship between the mediator and the dependent variable is significant. In our case, to test for a parallel mediated relationship between the dimensions of degree of digitalization and EO, we estimated a series of regression analyses (Table 2). First, the regression of the mediators on the independent variable with the coefficients a_1 and a_2. Second, the regression of the dependent variable on the independent variable with the coefficient c. Third, the regression of the dependent variable on both the independent variable and mediators with the coefficients b_1 and b_2. According to this regression procedure, the mediating effect is proved if the regression coefficient associated with the degree of digitalization and the EO relationship is statistically significant and decreases or goes to zero when the mediators are added to the equation.

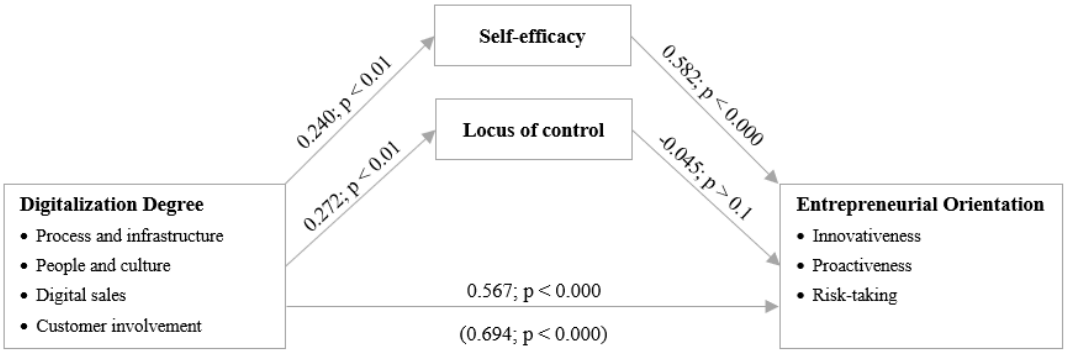
Table 2. Results of parallel mediation.

		Parallel mediation										
		M_1 (SE)				M_2 (LC)				Y (EO)		
Parameters		*Coeff.*	*Standard Error*	*p*		*Coeff.*	*Standard Error*	*p*		*Coeff.*	*Standard Error*	*p*
X (DD)	a_1	0.240	0.097	0.014	a_2	0.272	0.095	0.005	c'	0.567	0.103	0.000
M_1 (SE)		–	–	–		–	–	–	b_1	0.582	0.112	0.000
M_2 (LC)		–	–	–		–	–	–	b_2	-0.045	0.113	0.694
Constant		5.004	0.217	0.000		5.072	0.214	0.000		0.188	0.538	0.727
		R^2 = 0.042				R^2 = 0.055				R^2 = 0.391		
		$F(1, 141) = 6.182$, $p = 0.014$				$F(1, 141) = 8.136$, $p = 0.005$				$F(3, 139) = 29.760$, $p = 0.000$		

DD = digitalization degree – SE = self-efficacy – LC = locus of control

Results from the parallel mediation analysis demonstrated that the relationship between the degree of digitalization and EO is positive and significant (H1 supported) and transits by self-efficacy (H2 supported) but not by locus of control (H3 not supported). In more detail, there is first a significant relationship between the degree of digitalization and EO (c = 0.694; p < 0.000). Second, the degree of digitalization positively affects self-efficacy (a_1 = 0.240; p < 0.01), which in turn is positively related to EO (b_1 = 0.582; p < 0.000). Third, we also observed a significant relationship between the degree of digitalization and locus of control (a_2 = 0.272; p < 0.01), however, no significant relationship between locus of control and EO (b_2 = -0.045; p > 0.1) was obtained. Finally, we found that the regression coefficient between digitalization and EO decreases when the mediators are added to the equation (c' = 0.567; p < 0.000). Thus, our parallel mediation model (Figure 2) illustrates a partial mediating effect that transits through self-efficacy (MacKinnon et al., 2007; Hayes, 2013).

Figure 2. Final model.



4.6 DISCUSSION

The main objective of our paper was to empirically test the mediating roles of self-efficacy and locus of control on the relationship among the degree of digitalization and EO of internationalizing MSMEs. Although EO constitutes a broad field of interests, little attention has been paid to empirically investigating associations among the use of digital technologies, self-concept traits and EO in a large sample of entrepreneurs. Based on parallel mediation analysis, we built a model linking key dimensions of a firm's digitalization to EO and self-concept traits. By addressing the call put forward by Nambisan (2017) to progress the function of digital technologies into entrepreneurial activities, our research provided new empirical evidence on the importance of digital technologies in shaping entrepreneurial orientation. Our findings emphasized the mediating role of self-efficacy – the entrepreneurs' beliefs in their capabilities to generate given attainments – in exploiting the opportunities provided by the integration of digital tools at different levels of firms in order to define a strong entrepreneurial strategic posture. Nevertheless, even if we recorded a positive and significant relationship between the degree of digitalization and locus of control – the entrepreneurs' ability to exercise control over the environment – we found no positive and significant results regarding its mediating role on the relationship between the use of digital technologies and the EO of MSMEs. These findings reinforce the important role of personal traits to

better perceive the effect of digitalization in entrepreneurial strategic posture. This highlights the use of digital technologies as a potentially important source of value creation in the manifestation of entrepreneurial behaviors that, in turn, positively increases innovativeness, proactiveness and risk-taking of firms. Importantly, we showed that self-efficacy mediates the relationship between the degree of digitalization of firms and the adoption of EO.

4.6.1 Theoretical and practical implications

From a theoretical point of view, the major implication of current literature is the establishment of the parallel mediation model, which tested the interrelationship between the use of digital technologies, self-concept traits and the adoption of EO by internationalizing MSMEs. Indeed, the key contribution of our research includes the analysis of a parallel mediation that paints a different picture on entrepreneurial strategic decision-making and demonstrates that entrepreneurial self-efficacy could be a theoretical explanation for the positive relationship between digitalization and the EO of MSMEs. Furthermore, our research demonstrated relevant empirical evidence that entrepreneurs who digitalized her/his operational functions may lead their firms to a high degree of EO. Furthermore, by considering the degree of digitalization as an antecedent of EO, we provided a new perspective on the EO construct as a dependent variable and highlighted the importance of self-concept traits in building competitive advantage, thanks to the digitalization of the operational backbone. This observation concurs with the intrinsic conceptualizations of both self-efficacy and locus of control and contributes to the extension of entrepreneurial theories, especially in DE and EO fields. This integrative perspective is likely to provide new impetus to research on the impacts of emerging technologies in entrepreneurship and on the important role of individuals in shaping these digital opportunities to reinforce an entrepreneurial strategic posture and competitive advantage. From a practical perspective, our study outlined new knowledge for business owners and decision-makers who strive to integrate digital technologies into their operational functions in order to maintain and reinforce their innovativeness, proactiveness and risk-taking in foreign markets. We demonstrated that self-efficacy can be a way forward to strategically use digital technologies in order to reinforce EO and, simultaneously, competitive advantage of internationalizing firms. The parallel mediation analysis foregrounds a new way to help MSMEs enhance their perceived ability to successfully accomplish a certain level of performance in the definition of strategical posture. Indeed, our findings emphasized that the use of digital technologies is imperative in this regard. Consequently, we suggested that whether it be to improve innovativeness by integrating new actors in the idea-creation process via social networks or by developing new experiments with virtual reality and 3D printers – to enhance proactiveness by collecting and processing data through predictive algorithms or by using the internet of things to optimize the operational process – to securing risky action by using technologies, such as the cloud or the blockchain, many opportunities exist to improve the strategic orientation of internationalizing MSMEs.

As outlined by Schumpeter (1934), it is individual behaviors that influence the discovery and exploitation of opportunities initiated by technological change. Self-efficacy is theoretically significant to explain that entrepreneurs can take

advantage of technological means to define competitive strategies. In our results, as this belief-based variable mediates the relationship between the digitalization degree of firms and their EO, we emphasized the significant role of entrepreneurs' perception of their capabilities to successfully achieve a certain level of performance by using digital technologies. In contrast, our results highlighted that locus of control - more precisely, the internal locus of control - has no effect on this relationship. In other words, the disposition of an entrepreneur to perceive control of the environment plays no role in understanding the relationship between the degree of digitalization of MSMEs and their strategic orientation. As acknowledged in the literature, self-efficacy is about individuals' beliefs in their capabilities, whereas locus of control is related to the belief about outcome contingencies (Bandura, 2006). More specifically, self-efficacy is a judgment of the ability to perform given types of performance, whereas outcome expectations are judgements about the likely results of that performance (Bandura, 2006). Based on this assumption, we suggest that entrepreneurs are more willing to expend their effort and have more intrinsic interest to make appropriate use of digital technologies in order to drive and run their businesses in an entrepreneurial way. However, it may be currently challenging for them to ensure control of the expected results. In addition, given the pace of digital progress, it may also be difficult for entrepreneurs to perceive an outcome as being contingent upon their own behavior and under their personal control and understanding. By focusing on building and maintaining a meaningful digital operational backbone, we argue that internationalizing MSMEs can build on the personal characteristics of entrepreneurs, and especially on their self-confidence, to improve their existing strategic posture and be driven to seek entrepreneurial opportunities. In this sense, the digitalization of the business is vital to endowing the individual with entrepreneurial behavior.

4.6.2 Limitations and further research

One limitation of this research is the use of only two measures of self-concept traits. Although self-efficacy and locus of control both represent major human behaviors that influence one to become an entrepreneur, it would be relevant to integrate other personal attributes into the research model, like the need for achievement, networking behavior, or the willingness to take risks. We thus encourage further research to investigate the influence of other personal traits on the relationship between the degree of digitalization of firms and their EO. Furthermore, because we were interested mainly in the entrepreneurial behavior of decision-makers, we took into consideration the variable of the internal locus of control. Since digitalization is an external factor, it might be interesting for future studies to enhance the research model and test the influence of the variable external locus of control. We also pointed out a limitation in our study regarding the independent variable of the degree of digitalization of internationalizing MSMEs. Since we used the average level of digitalization, it was not possible to observe in detail the role of the internal and external dimensions of the firm on the relationship between the variables. Hence, future research might be interested in decomposing this variable and testing each of the dimensions in the model.

Another limitation can be formulated in view of the cross-sectional design of our study. Indeed, we provided an overview of one specific point in time and it would be relevant to take into consideration the impact of change over time. Thus, a longitudinal investigation would contribute to extending views into the dynamic nature of the relationship between the digitalization degree of internationalizing firms and their strategic orientation. In addition, our empirical results were collected from a sample of Swiss MSMEs, which raised questions about the extrapolation of the results to other countries. Future studies could address this issue by collecting empirical evidence in other countries and then providing comparative studies. Finally, as digital technologies are important determinants of competitive advantage, academic researchers need to focus in more detail on patterns of technological change as well as on individuals' competencies required in such a context. Furthermore, given the rapid development of the field of DE and the diversity of knowledge emerging from EO research, we believe it is time to propose a construct in the literature that can measure the digital entrepreneurial orientation of internationalizing firms and, thus, offer new insights for advancing knowledge in this domain.

4.7 CONCLUSION

Using a model that links key dimensions of firms and individuals, our research investigated the impact of the degree of digitalization of MSMEs on their EO and then assessed the mediating role of self-concept traits, i.e., self-efficacy and locus of control, in this relationship. Based on a survey of 143 MSMEs, we empirically tested our model through a parallel mediation analysis. To the best of our knowledge, this research is the first empirical study to consider the mediation role of personal attributes in explaining how the integration of digital technologies into the dimensions of an operational firm affects the EO of MSMEs. Our results emphasized that the degree of digitalization of MSMEs positively affects their entrepreneurial behavior. Moreover, our findings highlighted the mediating role of self-efficacy in exploiting digital technologies to reinforce entrepreneurial strategic posture. However, we found no positive and significant results on the impact of locus of control on the relationship between the degree of digitalization and the EO of MSMEs. By empirically testing the effect of self-concept traits on this relationship, our research demonstrated the importance of considering the behavior of entrepreneurs. Indeed, our research provides a strong basis for future work investigations on the role of an individual's self-confidence in the entrepreneurial process of using digital technologies to reinforce innovative, proactive and risk-taking behaviors of MSMEs. It contributes to the literature on DE and EO by underscoring not only the positive and significant relationship between the degree of digitalization and EO of MSMEs, but also the mediating role of personal attributes. By drawing a new look at traditional theories, these findings provide significant insights for the scholarly community, as well as practitioners and suggest that entrepreneurs should believe in their capabilities of exploiting digital technologies in order to build a strong strategic posture.

5 CHAPTER – CONCLUSION

5.1 RESEARCH SYNTHESIS

The concluding section first outlines a synthesis of the main findings and suggests an answer to the governing research question. Second, it highlights the research and managerial contributions as well as the main limitations of the research and suggests some avenues for future research. The purpose of the paper-based dissertation is to study the digitalization and internationalization of MSMEs. By investigating entrepreneurial behaviors of firms and individuals, the thesis suggests linking the dimensions of digitalization and internationalization of MSMEs through an overall conceptual process. The research arises following the advent of digital technologies and its effects on international trade. It also emerges, given the gap in current scientific theories regarding traditional models of internationalization that do not consider the pervasive role of digital technologies (Andersson et al., 2014; Welch and Paavilainen Mäntymäki, 2014; Knight and Liesch, 2016; Welch et al., 2016; Coviello et al., 2017; Kriz and Welch, 2018; Hult et al., 2020). The use of digital technologies is transforming the very nature of exchanges in foreign markets and creates a new reality of digitally connected internationalization. This new reality transforms the very foundations of the internationalization paradigm. It is reshaping the stakeholders in international trade, the nature of doing business abroad, competitiveness, as well as the flow of economic benefits (Manyika et al., 2016). Moreover, the use of digital technologies directly impacts companies in their functions, geographical configuration, production and customer interactions and thus transforms their internationalization process by allowing new concrete opportunities to reach global scale (Coviello et al., 2017). In such a context, firms are facing new challenges to exploit these opportunities, maintain a competitive advantage and build strong entrepreneurial competences in foreign markets.

In view of the novelty of the topic and its growing emergence in scientific research, the research aims to contribute with empirical data collection that involves a large sample of companies. With the proposal of an original approach to link the dimensions of the digitalization and internationalization of companies within a positivist epistemological framework, the research provides several research and managerial contributions. Due to the lack of empirical evidence associated with the topics of interest, the research uses two methodological approaches – a conceptual and a quantitative study – to collect empirical data. By combining two approaches, the research obtains valuable insights from existing research and increases the breadth of the literature with statistical evidence. In addition to providing empirical results, the research participates in the scientific debate with the representation and explanation of the role of digital technologies in internationalization activities of firms. It also provides numerous propositions to enhance the strategic posture of internationalizing MSMEs with the use of digital technologies. On the basis of three scientific papers, the thesis develops new knowledge that supports established MSMEs in using digital technologies and achieving entrepreneurial and competitive global activities. The collection, analysis and interpretation of all the results from the research have given rise to an overall conceptual process that links together the dimensions of the digitalization and internationalization of

firms. The main result of the thesis, therefore, revolves around the representation of this conceptual process which, by means of the use of digital technologies, drives established MSMEs to shape entrepreneurial behaviors needed to expand and grow in foreign markets. By bringing together these dimensions, the thesis emphasizes the importance of the role of entrepreneurial behaviors of companies and individuals that are crucial to discover and exploit opportunities by using digital technologies and build a strong competitive advantage abroad. It provides new impetus in entrepreneurship, DE and IE fields. Before going into more detail on the main result of the thesis, the findings of each of the articles from the introductory part are discussed.

At the outset, the first article emphasizes a lack of congruence in scientific research on international trade between existing theoretical models of internationalization and the current digital context in which MSMEs are evolving (Andersson et al., 2014; Welch and Paavilainen Mäntymäki, 2014; Knight and Liesch, 2016; Welch et al., 2016; Coviello et al., 2017; Kriz and Welch, 2018; Hult et al., 2020). Based on a literature review and an in-depth analysis of five relevant scientific papers, the first article shed light on the effects and opportunities associated with the digitalization and the internationalization of firms. A synthesis of the results is outlined in the appendix of the paper (Table 3) and provides an overview of the main impacts and opportunities related to the use of digital technologies in the internationalization process of firms. This overview is organized through four main fields of activities that are at the center of interest when firms are trading abroad. The main results can be summarized as follows; *MSMEs are immediately connected on a global scale without necessarily requiring specific resources – they are threatening large companies by partnering and sharing their skills via large groups of entrepreneurs – transaction costs are significantly reduced – communication, distribution and production channels are dematerialized – markets are virtual, instantaneous and more competitive – physical flows are giving way to data flows – geographical distances are virtually reduced and allow partner networks to largely dominate trade negotiations between nations – seller and buyer meet directly, regardless of distance or time zones – consumers are directly integrated into development and internationalization processes – and, the emergence of user communities and social media enables firms to test and adapt offers to local markets, in some cases, to diversify activities and generate alternative revenues*. Other insights on the digital context are highlighted in the results, such as the use of technologies, like artificial intelligence to anticipate and optimize decision-making or 3D-printers to relocate production close to end-customers. From the results of the first article, the thesis underlines the importance of addressing together the topics of digitalization and internationalization of MSMEs. The findings also demonstrate that the use of digital technologies triggers a transformation into internal and external functions of firms and involves a redesign of the business activities. It can lead firms to define new business models and also facilitates a "servitization" transition (Aagaard et al., 2019) that enables new opportunities for creating value and defining competitive advantage abroad. Finally, as the use of digital technologies transform and dematerialize production, transportation and logistics patterns, the findings led the research to call into question the "international" dimension of international trade. Instantaneous access to foreign markets is a reality. Nowadays, international trade is

like a large ecosystem of entrepreneurs seeking independent opportunities. In the near future, entrepreneurs who aim to expand abroad will no longer care about country borders, suppliers or customer locations. They will focus only on their own value proposition, which will make the difference when it comes to specific local foreign markets. In these circumstances, linking the research streams of digitalization and international business opens the door for developing new theoretical frameworks on the recognition of digital opportunities to extend to foreign markets. Digital technologies discussed in the first paper would then support firms in adopting a competitive strategy of internationalization and in defining a new value proposition better adapted to foreign market needs.

These findings have provided the basis for defining the objectives of the second article, which focuses on linking the two dimensions of interest through the entrepreneurial behaviors of firms. The research suggests investigating entrepreneurial behaviors by following two assumptions. First, because digital technologies shape spatial and temporal dimensions of entrepreneurial activities, their use is widely associated with entrepreneurship activities (Kraus et al., 2019). More specifically, as emerging technologies have changed the nature of uncertainty inherent in entrepreneurial processes and outcomes as well as the firm's governance, which becomes less centralized and more distributed between a diverse set of actors, their use might reinforce entrepreneurial behaviors (Nambisan, 2017). Second, the research notices that the role of entrepreneurial behaviors has been broadly investigated in research on the internationalization of firms (Jones and Coviello, 2005; Brouthers et al., 2015). In the IE field, researchers have suggested that entrepreneurial behaviors, such as EO, provide firms with skills to enhance their internationalization intensity (Jantunen et al., 2005; Brouthers et al., 2015). Following these insights, the second paper uses empirical data in order to test a conceptual process based on three dimensions of MSMEs; their degree of digitalization, their EO and their internationalization propensity. Built on regression analysis, the findings first emphasize a positive and significant relationship between the degree of digitalization of the MSMEs surveyed and their entrepreneurial behaviors. Second, the results found a positive and significant relationship between proactive behaviors and the scope of internationalization, as well as between risk-taking behaviors and the speed of internationalization of MSMEs. In elaborating the results, the paper discusses the relationship between the digitalization degree and EO, as well as EO and the internationalization intensity of firms. It provides some suggestions about how digital technologies might reinforce entrepreneurial behaviors that, in turn, will enhance the internationalization propensity of MSMEs. First of all, results demonstrate a greater involvement of companies towards the digitalization of internal functions (i.e. process and infrastructure, as well as people and culture). In line with scientific research, MSMEs may require more time and resources to achieve a transformation of external functions, as it leads to a new value proposition definition and, in some cases, a redesign of their business model (Bharadwaj et al., 2013; Pagani, 2013; Gray and Rumpe, 2015; Kane et al., 2015; Porter and Heppelmann, 2015; Ross et al., 2016; Schallmo et al., 2017; Sebastian et al., 2017; Autio et al., 2018; Aagaard et al., 2019; Kraus et al., 2019). Then, based on statistical evidence, numerous propositions are formulated regarding the effects of the use of digital technologies on each EO component, as well as the effects of each

EO component on the internationalization intensity of MSMEs. From a perspective of innovativeness, the use of digital technologies might enable firms to better encourage collaboration with diverse actors, sharing of ideas and collective development of new value creation. Thanks to the current flow of hyperconnectivity afforded by the digital context and through the use of platforms, user communities and social media, the propositions encourage firms to integrate a new set of actors into creative processes and experimentations. Regarding the innovativeness and the internationalization of firms, the results found no positive and significant relationship. However, the paper suggests that by exploiting the digital technologies and the hyperconnectivity they create, firms would benefit from new forms of collaboration and strategic alliances in foreign markets. Furthermore, by using digital platforms, mobile applications, augmented reality and 3D-printers, internationalizing firms have numerous innovative ways to personalize offers in several foreign markets, build unique experiences at a distance with end-users and even start producing nearby customers. From a perspective of proactiveness, the paper highlights the important role of data in improving competitive and entrepreneurial behaviors of firms. As argued by Neubert (2018), by collecting data and processing them through predictive algorithms, firms can assess their current conditions and future market attractiveness. Consequently, by being more aware of need and change in the operating environment, firms improve their competitive and strategic posture. Furthermore, in order to increase customization, data can be employed for the deployment of user-centric and knowledge-driven products and services. Finally, as results exhibit a positive and significant relationship between proactiveness of MSMEs and their scope of internationalization, the paper suggests that the use of emerging technologies will support firms in being more proactive on a global scale in the decision-making process. Technologies, such as big data, internet of things, machine-learning and mobile applications, might allow firms to perform their market knowledge and thus to extend their scope in foreign markets and engage in new niche markets by taking aggressive actions. From a perspective of risk-taking, the paper proposes that because firms are better informed about their environment and customers' expectations, they would be more willing to take risky actions. Moreover, as the use of digital technologies has redesigned the nature and source of uncertainty inherent in entrepreneurial activities (Nambisan, 2017), it provides firms with new opportunities to take risks. Because they are able to evaluate current and future markets conditions, they would make better decisions even under conditions of uncertainty. As the results demonstrate a positive and significant relationship between risk-taking and the speed of internationalization of MSMEs, the paper suggests that the use of digital technologies would support firms in taking risks in foreign markets. For instance, by securing the storage and transmission of information, blockchain technology can be used by firms to make any transactions in a verifiable and permanent way all around the world. It also provides more direct and greater integration of data between actors and thus moderates the need for intermediaries. In that regard, by increasing immediacy and reducing the need for third parties, the use of emerging technologies would speed up the pace of exchanges abroad and allow firms to quickly generate revenues on a global scale. Furthermore, such disintermediation would reduce dependence on location-specific value chain assets and resources. Based on these insights, the second

paper concludes with the suggestion of defining a digital and entrepreneurial strategy of internationalization. Driven by entrepreneurs and decision-makers, this strategy will support MSMEs to exploit digital opportunities and reinforce competitive advantage in foreign markets.

In order to further develop the role of entrepreneurial behaviors that link the dimensions of digitalization and internationalization, the third paper focuses on entrepreneurial behaviors of individuals. As a lever of influence to operationalize the orientation of strategic decisions (Miller and Friesen, 1982; Covin and Slevin, 1991), individuals and their entrepreneurial behaviors are paramount in the discovery and exploitation of opportunities provided by technological changes and in the definition of competitive strategies (Schumpeter, 1934). Furthermore, to better describe and forecast the growth options pursued by an entrepreneur, scholars acknowledged that the individual's perceptions which shape entrepreneurial behaviors on what the company can or cannot achieve with its technological resources are crucial (Gruber et al., 2012). On the basis of these assumptions, the third paper aims to provide a more exhaustive representation of individuals and their entrepreneurial behaviors that shape the discovery and exploitation of opportunities in a digital context. It thus uses the conceptual process from the second paper and includes two major self-concept traits of entrepreneurs in the model; self-efficacy – the entrepreneurs' beliefs in their capabilities to generate given attainments, and locus of control – the entrepreneurs' ability to exercise control over the environment. Based on parallel mediation, the research model examines how the behaviors of entrepreneurs mediate the relationship between the degree of digitalization and EO of internationalizing MSMEs. Parallel mediation is a more complex model than traditional ones because it takes into consideration more than one mediator to test the relationship between the independent and dependent variables (Hayes, 2013). This model is consistent with the purpose of the third article that seeks to test the role of more than one self-concept trait at the same time within the same relationship of variables. It allows the study to define if any of the self-concept traits in question drive the relationship among the degree of digitalization and EO more than the other, or if both contribute to it. The results demonstrate that the relationship between the degree of digitalization and EO is positive and significant and transits by self-efficacy but not by locus of control. In more detail, the findings outline a positive and significant relationship between self-efficacy and the independent variable of the degree of digitalization, as well as the dependent variable of EO. Regarding locus of control, although the results find a positive and significant relationship with the independent variable of the degree of digitalization, no relationship with the dependent variable of EO was found. Finally, because the regression coefficient between digitalization and EO decreases when the mediators are added to the equation, the findings exhibit a partial mediating effect that transits through self-efficacy (MacKinnon et al., 2007; Hayes, 2013). In elaborating the results, the research outlines the major role of individuals' entrepreneurial behaviors to use digital technologies and shape EO of firms. In more detail, it highlights the importance of individuals' *judgements of their capabilities to organize and execute courses of action required to attain designated types of performance* (Bandura, 1986) for discovering the opportunities provided by the use of digital technologies and exploiting them to improve entrepreneurial behaviors of MSMEs active

in foreign markets. In other words, by demonstrating high self-efficacy, entrepreneurs seem to make better use of the digital technologies applied to their operational functions to increases the innovativeness, proactiveness and risk-taking of their firms.

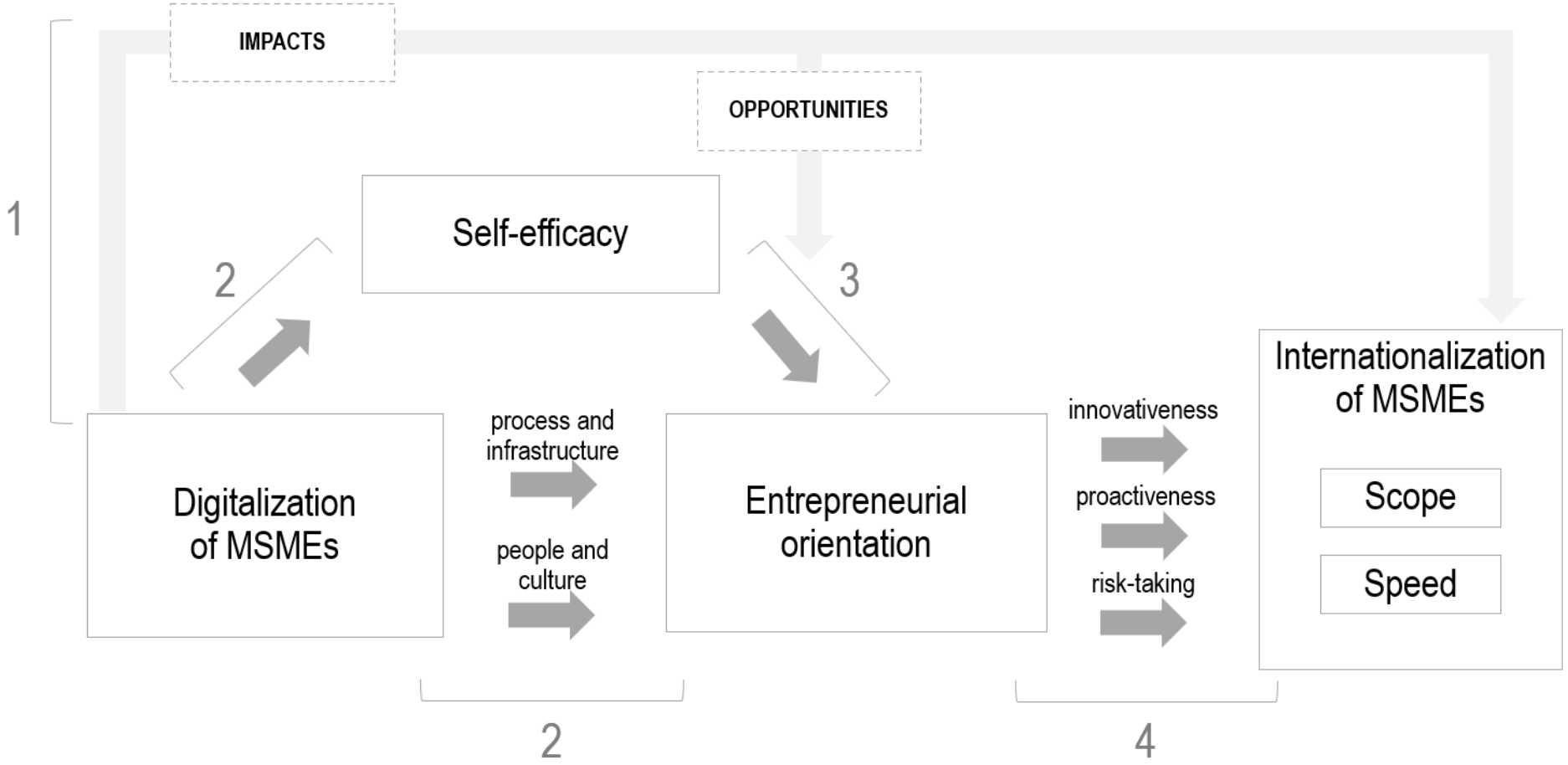
Figure 9 – Compiling the results of the three articles



In investigating and elaborating the first paper of the thesis, the research chooses to study the dimensions of digitalization and internationalization in a broader way and, thus, takes a global view. It is by further investigating the relationships between these dimensions that the research has focused on the entrepreneurial behaviors of companies and individuals. Taking entrepreneurial behaviors into account in the second and third articles allows the research not only to link the dimensions of digitalization and internationalization, but also to observe potential interactions through empirical data. In compiling the results of the three articles, the thesis builds an overall conceptual process that provides an answer to the governing research question. The overall conceptual process considers in the same model the key dimensions of digitalization, entrepreneurial behaviors of firms and individuals and internationalization in order to outline the interactions between each dimension. Before introducing and discussing the overall conceptual process, the research gathers the findings of the three articles, as shown in Figure 9. This global representation combines all the results of the research through a single schema. It synthesizes the main impacts and opportunities of the digital context on the internationalization process of firms and shows the orientation of each interaction between the dimensions of interest. This representation allows the research to present and discuss the final result of the thesis illustrated in the form of an overall conceptual process (Figure 10). By compiling all the findings into the same process, the research suggests an answer to the governing research question – *How can MSMEs use digital technologies to achieve entrepreneurial and competitive international activities in a digital context*? – and presents its arguments by describing the interactions of each dimension detailed in the overall conceptual process.

At a more general level, the overall conceptual process first focuses on interaction 1) that directly links digitalization and internationalization of MSMEs. As an input for entrepreneurial opportunities (Giones and Brem, 2017), the use of digital technologies across the globe brings major changes in the internationalization patterns of firms (Coviello et al., 2017). It is impacting the internationalization process of firms and providing new possibilities. These effects are illustrated by the light grey arrow in the overall conceptual process. At an operational level, the overall conceptual process incorporates entrepreneurial behaviors of firms and individuals in order to associate the digitalization and internationalization of MSMEs. First, the entrepreneurial behaviors of firms are represented by the concept of EO, which provides key capabilities for building competitive advantage in foreign markets (Lumpkin and Dess, 1996). Second, the entrepreneurial behaviors of individuals are represented by self-efficacy as an essential lever to make an effective use of digital technologies and drive EO. It uses dark grey arrows to represent the interactions between the dimensions of interest. In more detail, interactions 2) highlight how the use of digital technologies impacts entrepreneurial behaviors of firms and individuals. It takes into consideration the internal levels of digital transformation (process and infrastructure as well as people and culture), which were positively and significantly related to the entrepreneurial behaviors of firms and individuals. More precisely, empirical evidence outlines a positive and significant relationship between the degree of digitalization of internal functions and the EO of firms, as well as the self-concept traits investigated in the third paper.

Figure 10 – Final version of the overall conceptual process



In arguing interactions 2), the research uses mainly two assumptions made by Nambisan (2017). First, as digitalization has rendered entrepreneurial processes and outcomes less bounded, it allows firms to rethink their activities with more flexibility and continuous improvement (Nambisan, 2017). In terms of processes, the use of digital technologies has reshaped the spatial and temporal boundaries of entrepreneurial activities; it has transformed where and when the activities are achieved (Nambisan, 2017; Kraus et al., 2019). In these circumstances, the use of digital technologies allows more fluidity and variability in entrepreneurial processes. By decreasing costs, standardizing processes, optimizing operations, shortening transactions and reducing location and physical asset dependencies, digital technologies, such as digital platforms, 3D-printers, internet of things, cloud computing and machine-learning are offering new concrete solutions to firms (Autio and Zander, 2016; Ross et al., 2017; Coviello et al., 2017). From a perspective of outcomes, the use of digital technologies impacts the structural boundaries of the offerings and provides new possibilities in terms of features, value, scope and market reach (Nambisan, 2017). It allows firms to analyze numerous data, to drive several experimentations and to further develop the offers at a distance. In addition to changing many aspects of business functions, the changes in processes and outcomes lead to changes in behaviors and actions of the entrepreneurs who are more willing to strive towards continuous improvement (Nambisan, 2017). Second, the use of digital technologies and the hyperconnectivity it provides, allow firms to involve a broader set of actors in the creative process, sharing of ideas and experimentations. Governance becomes more decentralized and distributed between groups of actors that share value creation, which, thus, led to *less predefinition in the locus of entrepreneurial agency* (Nambisan, 2017). The use of digital technologies has led to more collective ways of pursuing entrepreneurship and consequently reinforces the entrepreneurial behaviors of both firms and individuals.

Interaction 3) displays the nexus between individual entrepreneurial behaviors, opportunities provided by the digital context and entrepreneurial behaviors of firms. It therefore postulates that the entrepreneurial behaviors of entrepreneurs are a central driver for discovering and exploiting the opportunities offered by the digital context to build competitive advantage (Schumpeter, 1934). In the overall conceptual process, the entrepreneurial behaviors of individuals are operationalized through self-efficacy – the entrepreneurs' beliefs in their capabilities to generate given attainments. In more detail, this interaction considers the individuals' self-efficacy as a key element in the discovery and exploitation of the opportunities provided by the use of digital technologies from interaction 1) (regarding the internationalization process) and 2) (regarding the internal operational functions) in order to adopt an EO and build strong competitive advantage. It demonstrates how self-efficacy mediates the relationship between the use of digital technologies within MSMEs and their entrepreneurial behaviors operationalized by EO. In the literature, numerous researchers associate self-efficacy and a firm's strategic posture and argue that the more individuals believe in their capabilities to successfully reach attainments, the more they may be likely to adopt entrepreneurial behaviors to drive their firms (Chen et al., 1998; Zhao et al., 2005). Thus, entrepreneurs with high self-efficacy would be more willing to favor innovative ideas, creative process and experimentation to launch new products and services, to anticipate change,

act proactively on their environment and to take bold actions (Poon et al., 2006; Khedhaouria et al., 2015; McGee and Peterson, 2019). Such a combination of entrepreneurial behaviors (innovativeness, proactiveness and risk-taking) would lead the company to build and maintain strong competitive advantages in markets and especially in foreign ones. However, although EO is paramount in building strong competitive advantage in foreign markets as acknowledged in the scientific literature on IE (Lumpkin and Dess, 1996), it is not the only entrepreneurial dimensions required abroad (Oviatt and McDougall, 2005). Researchers in the IE field therefore include the major role of opportunities, which, in most cases, derive from the design and implementation of an idea by the entrepreneur (Oviatt and McDougall, 2005; Zahra et al., 2005). In the overall conceptual process, these opportunities pass through interactions 1) and 2) and are directly linked with the entrepreneurs' behaviors. Entrepreneurial behaviors of individuals, such as self-efficacy, is required to shape opportunities provided by the digital context in order to reinforce strategic posture with strong competitive advantage.

Interaction 4) concretizes the output of the overall conceptual process; increased internationalization intensity of MSMEs in a digital context. At this stage of the process, EO is viewed as building on concrete opportunities provided by the digital context and leveraged by the entrepreneur according to her/his level of self-efficacy. This last interaction is based mainly on the association made in IE field between EO and the internationalization propensity of firms (Zahra and George, 2002; Jantunen et al., 2005; Brouthers et al., 2015). In the literature, EO is the capacity to adopt new behaviors for managing future changes in the external environment – engaging in investments with uncertain returns – demonstrating innovative, proactive and risk-taking efforts to better discover and exploit opportunities and outperform competitors – and building strong competitive advantage (Miller, 1983; Covin and Slevin, 1989; Lumpkin and Dess, 1996). Based on these assumptions, researchers in IE argued that such entrepreneurial behaviors provide the key competences to improve an internationalization propensity (Brouthers et al., 2015; Jantunen et al., 2005). Interaction 4) is driven mainly by the propositions made previously in the research regarding the different ways MSMEs can enhance EO through the use of digital technologies and build solid competitive advantage abroad. As suggested, firms can first benefit from the current flow of hyperconnectivity all around the world to improve their innovative behaviors. Using digital technologies would, for instance, encourage collaboration with a diverse set of actors, sharing of ideas, collective development of new value creation, experimentations and customization of offers in several foreign markets. Second, the use of digital technologies would lead firms to being more proactive in a decision-making process on a global scale. By collecting data and processing them through predictive algorithms, firms would improve their competitive position. They would thus be more willing to take aggressive actions in order to expand and reach new foreign markets. These data can also be deployed for user-centric and knowledge-driven products and services and thus enhance customization. Third, as they are better informed about the environment and customers' expectations, firms would be more willing to take risks and make efficient decisions even under conditions of uncertainty. In that regard, as the use of digital technologies transformed the nature and source of uncertainty inherent in entrepreneurial activities (Nambisan,

2017), it provides better conditions to take risky actions. Furthermore, the use of digital technologies, such as the blockchain, would reassure firms in their operations (storage and transmission of information are secured) and thus encourage them to take riskier actions in foreign markets. Finally, thanks to the immediacy and disintermediation provided by the use of such digital technologies, firms would be able to generate revenues more quickly on a global scale.

The overall conceptual process composed of these four detailed interactions allows the thesis to answer the governing research question interested in defining *how MSMEs can use digital technologies to achieve entrepreneurial and competitive international activities in a digital context*: By associating the dimensions of interest; digitalization of MSMEs, entrepreneurial behaviors of firms and individuals as well as internationalization of MSMEs into the same process, the research provides a concrete model. This model aims to guide MSMEs in the deployment of entrepreneurial and competitive global activities. In elaborating the final result, the thesis outlines some recommendations. First, firms are encouraged to use digital technologies as input for entrepreneurial opportunities and apply them to their operational and strategical functions. At an operational level, applying digital technologies would transform firms' functions and offer new opportunities in terms of process and outcomes. At a strategical level, the use of digital technologies results in less centralized and more distributed governance between various actors. It would thus provide entrepreneurs a favorable context to collaborate, to share the creation of value as well as to interact instantly with stakeholders. In addition, data processing would allow firms to extract information and generate knowledge from raw data. With such information and knowledge, entrepreneurs would be more inclined to optimize the decision-making process according to the current and future conditions of their business. Second, entrepreneurs are encouraged to lead and leverage the opportunities provided by the digital context with the aim to build a strong EO and competitive advantage. As acknowledged in the literature, digital transformation of firms is primarily a managerial concern rather than a technical issue (Li et al., 2018). The proper use of digital technologies would thus depend on the entrepreneurs' behaviors. It would be determined by their ability to recognize and exploit opportunities in order to transform previous cognitive models and thinking patterns. The opportunities provided by the digital context should be driven by the entrepreneurs with the aim to adopt a strong EO. In doing so, entrepreneurs are required to emphasize entrepreneurial behaviors. More particularly, they are encouraged to demonstrate a high sense of self-efficacy. The more entrepreneurs believed in their ability to successfully achieve given attainments, the more properly they would use digital technologies to build a strong EO and a solid competitive advantage. Third, as the use of digital technologies would improve the innovativeness, proactiveness and risk-taking, firms are encouraged to leverage these entrepreneurial behaviors towards their global activities. By favoring innovative ideas, a creative process and experimentation to launch new products and services – anticipating change, acting proactively on the environment and – taking bold actions, such entrepreneurial behaviors would lead companies to enhance their business in foreign markets and increase their scope and speed of internationalization. Finally, the last recommendation consists of the definition of a new strategy that takes into consideration the opportunities afforded by

the digital context. In that regard, entrepreneurs should define a digital and entrepreneurial internationalization orientation based on the overall conceptual process. Each step of the process will support MSMEs to define the strategy and lead them to achieve entrepreneurial and competitive international activities in a digital context.

5.2 RESEARCH AND MANAGERIAL CONTRIBUTIONS

Through an original approach that linked the dimensions of the digitalization and internationalization of firms within a positivist epistemological framework, the thesis provides several research and managerial contributions. In view of the novelty of the topic and its growing emergence in scientific literature, choosing a positivist investigation allows the research to rely on statistic evidence and to set up explanatory associations of the research streams involved. It participates in the scientific debate by investigating the effects and opportunities associated with the digital context and the internationalization of firms and by studying the impact of digital technologies on the entrepreneurial behaviors of internationalizing MSMEs. In terms of research implication, each of the papers from the thesis provides valuable new scholarly contributions to the fields of entrepreneurship, DE and IE. In terms of managerial implication, the research addresses the digital context at the firm's structural and strategic levels and associates it with internationalization activities. The research uses two methodological approaches to collect empirical data. It thus provides valuable insights from existing research and increases the breadth of the literature with statistical evidence. The compilation of findings provides numerous opportunities to entrepreneurs that can be shaped by the use of digital technologies to support entrepreneurial behaviors as well as increase the propensity of internationalization. The central research contribution of the thesis is the development of an overall conceptual process that demonstrates how the use of digital technologies is impacting the firms' and individual entrepreneurial behaviors of internationalizing MSMEs as well as how these firms can be shaped to enhance their internationalization propensity. This overall conceptual process addresses the current lack of understanding in the significant digital phenomenon that is completely transforming global trade. Generally, research in entrepreneurship and especially research in the IE field has neglected the disruptive impact of emerging technologies and the thesis contributes in the literature by closing this most urgent gap.

By linking insights from literature on internationalization and digitalization of firms, the first paper contributes to the research by suggesting a new perspective on contemporary research on the internationalization process of firms. On the one hand, it has emerged following the current need to further develop theoretical perspectives in the IE field (Keupp and Gassmann, 2009). On the other hand, it is grounded in the lack of congruence in internationalization research between existing models and the current digital context in which firms operate (Andersson et al., 2014; Welch and Paavilainen Mäntymäki, 2014; Knight and Liesch, 2016; Welch et al., 2016; Coviello et al., 2017; Kriz and Welch, 2018; Hult et al., 2020). Nowadays, understanding the scope of digitalization is paramount and firms are encouraged to integrate digital technologies with the aim to redesign their strategies. First, the article sheds light on how the digital context is currently transforming activities of internationalization and provides a better understanding of how the use of

digital technologies can lead to new forms of internationalization as well as new entrepreneurial opportunities in foreign markets. By investigating how digitalization affects the internationalization process of MSMEs and what entrepreneurial opportunities might offer the use of digital technologies in global activities, results from the first paper outline numerous perspectives to generate a new source of value. The main contribution is the elaboration of a synthesis that concisely exposes the impacts of digitalization on internationalization patterns of firms. Organized according to four main dimensions of internationalization, the synthesis also suggests several opportunities that firms could undertake in foreign markets. It identifies key points that entrepreneurs could benefit from in global trade by using digital technologies. Second, because the topic of digitalization suffers from sematic confusions, the first article provides conceptual clarity of the digital context. It helps clarify potentially conflicting issues of terminology and addresses its meaning in a context of international trade. These clarifications are also significantly beneficial to founders and decision-makers. As observed by Neubert (2018), managers currently have little theoretical knowledge of digitalization. Thus, they may benefit from the use of digital technologies in several ways if they can rapidly master and apply them to their internationalization process. The faster they understand the benefits of digital technologies, the faster they can improve their decision-making processes and accelerate the internationalization of their firms (Neubert, 2018).

The second paper of the thesis has emerged following the lack of scientific research that investigates the role of digital technologies in entrepreneurship pursuits (Nambisan, 2017; Kraus et al., 2019). Although the contemporary importance of digital technologies is well established, existing scientific research has overlooked their specific aspects in shaping entrepreneurial opportunities, decisions, actions, and outcomes (Nambisan, 2017). The second paper fills this gap by focusing on the effect of the use of digital technologies on entrepreneurial behaviors of internationalizing firms. First, the research makes an important contribution to the literature by linking the digitalization and internationalization of firms through their entrepreneurial behaviors. By doing so, the research suggests a new perspective to the field of entrepreneurship on these two dimensions. Second, the central contribution of the second paper includes the development of a conceptual process that associates the relationships between the dimensions of digitalization, EO and the internationalization of MSMEs. In more detail, it outlines how the degree of digitalization of MSMEs impacts their EO and tests how EO affects the internationalization propensity of firms. Third, in terms of managerial implications, the results appear to suggest and discuss numerous propositions that highlight how digital technologies could improve EO of MSMEs, that in turn, would enhance their internationalization propensity. Results encourage firms to consolidate EO capabilities with the use of emerging technologies *to further activate their ecosystem, deepen market knowledge, develop stronger skills, optimize internal resources and better exploit external ones, improve operations, and shape new value propositions with greater flexibility and responsiveness* (Hervé et al., 2020). These propositions also contribute to the literature by suggesting a wide range of opportunities that can be shaped by firms using digital technologies. By addressing the call put forward by Nambisan (2017), these opportunities outline the major role of digital technologies in entrepreneurship pursuits and thus contribute to building new perspectives in DE. As these opportunities

aim to reinforce the innovativeness, proactiveness and risk-taking behaviors of firms – attitudes vital in the pursuits of entrepreneurial activities abroad – the research also contributes to the field of IE with the overall conceptual process and the suggested propositions. Finally, the research represents one of the first studies that outlines empirical evidence of the measurement of the degree of digitalization of firms and observes how it impacts entrepreneurial behaviors.

Although EO is broadly investigated in scientific research, little attention has been paid to empirically examining its associations among the use of digital technologies and self-concept traits in a large sample of entrepreneurs. The major research contribution of the third paper is the construction of a parallel mediation model that measures how the entrepreneurial behaviors of entrepreneurs mediate the relationship between the digitalization degree of MSMEs and their EO. It offers the literature a new angle on entrepreneurial strategic decision-making and demonstrates that entrepreneurial self-efficacy could be a theoretical explanation for the positive and significant relationship between the degree of digitalization and EO of MSMEs. Drawing on Schumpeter's work (1934), arguing that it is entrepreneurs who drive the discovery and exploitation of opportunities arising from technological change, the third article emphasizes the important role of the individual's entrepreneurial behaviors in shaping digital opportunities. It extends traditional perspectives on entrepreneurship theories that have not yet considered looking at the use of digital technologies together with the entrepreneurial behaviors of firms and individuals. Findings provide new insights to research on the effects of digital technologies in entrepreneurship and on the importance of entrepreneurs' self-efficacy in shaping the digital opportunities to reinforce an entrepreneurial strategic posture and competitive advantage. By taking an integrative perspective on the dimensions investigated, the research contributes to the extension of entrepreneurial theories, especially in the entrepreneurship field. It also contributes to the DE field by further developing the role of digital technologies in the recognition and pursuit of entrepreneurial activities. In addition, although the well-established concept of EO has so far been recognized as a mainly independent variable, the research suggests a new view by considering the degree of digitalization of firms as an independent variable and EO as a dependent variable. In terms of managerial implications, the third paper provides new knowledge to entrepreneurs who strive to apply digital technologies into their firms' functions in order to reinforce their strategical posture. Findings demonstrate that self-efficacy can be a way forward to strategically using digital technologies and reinforcing entrepreneurial behaviors of firms. The results of the parallel mediation analysis highlight that the entrepreneurs' perception of their capabilities to successfully achieve a certain level of performance play a significant role in using digital technologies to enhance strategical posture. It has been acknowledged in scientific research that individuals tend to be attracted to and to perform better in activities for which they have high self-efficacy and, inversely, to avoid activities for which they have low self-efficacy (Bandura, 1982; Wood and Bandura, 1989; Boyd et al., 1994; Chen et al., 1998; Forbes, 2005; McGee and Peterson, 2019). By understanding and mastering digital technologies with confidence, entrepreneurs would perform better in applying them for strategic purposes. By adopting the insights of Wood and Bandura (1989) and applying them to the research topic, the more deeply entrepreneurs believe in the effectiveness of their work and ability to successfully

accomplish any task with the use of digital technologies, the more they will aim for ambitious goals when defining the strategic posture of their firms and make a stronger commitment to achieving them.

5.3 LIMITATIONS AND RESEARCH PERSPECTIVES

The last section of the thesis outlines the most significant limitations and how they link to potential future research. In the scientific literature in the fields of management and entrepreneurship, research interested in digital technologies has adopted a mainly positive perspective of the impact of technological advances on firms' functions (Tilson et al., 2010; Bharadwaj et al., 2013; Matt et al., 2015; Porter and Heppelmann, 2015; Autio, 2017; Greif et al., 2017; Legner et al., 2017; Nambisan, 2017; Ross et al., 2017; Autio et al., 2018; Li et al., 2018; von Briel et al., 2018; Aagaard et al., 2019; Kraus et al., 2019). By allowing companies to streamline their operational processes, improve interaction with their entire ecosystem, integrate users into their developments, or even revolutionize their business models, it is not questioned that the use of these emerging technologies provides many advantages to companies. Nowadays, digitalization has become an almost *sine qua non* condition for survival in the markets and, in particular, on the global stage. Based on these assumptions, the thesis considered the use of digital technologies mainly from a positive and beneficial perspective. However, digital technologies and their rapid advances also present numerous risks and limits, particularly in terms of privacy issues, labor substitution, cybercrime, price pressure and global competitiveness. Their extensive and widespread use also makes businesses highly dependent on the proper functioning of these tools and on a stable internet connection. It thus highlights the need for additional research. To circumvent this issue, future research on the digitalization of firms' functions might consider the risks and limits related to the use of digital technologies. It would be relevant to investigate in more detail the disadvantages that digital technologies could cause and to better warn companies and societies of the risks incurred.

A second limitation is highlighted with regards to the sample. Based on data from Swiss MSMEs, empirical results raised question about the extrapolation of the findings to other countries. Although Switzerland is a good representative of internationalization and digitalization of firms, collecting data from a single country restricts the scope of the results and the overall conceptual process. Further research could extend the collection of empirical data in other countries and thus provide comparative studies on the subject. Furthermore, as outlined in the first paper, a very interesting research perspective is the emerging markets and their increasing involvement in global trade. Global connections are linking a broader and more diverse set of countries today (Manyika et al., 2016). With the current hyperconnectivity all over the world, emerging markets are increasingly participating in global trade and South-South trade is growing very fast (Manyika et al., 2016). Researchers in the field should pay more attention to the burgeoning niche markets that are flourishing in these emerging markets. It would be relevant to further develop their role and growing position in world trade. As emerging economies evolve in the midst of a digital revolution, they are considered pioneers in the use of digital technologies.

The research outlines a third limitation regarding the cross-sectional design of the quantitative study. Data were analyzed at a specific point in time and it would be fruitful to extend the view. Given the dynamic nature of the topics investigated, future research is encouraged to adopt a longitudinal approach that involves repeated observations of the variables over time. Regarding the variables, two limitations are brought out. First, as it was not possible to build a multidimensional construct of internationalization intensity, the research had to observe each variable related to internationalization separately. It would therefore be valuable to formulate a construct that takes into account the major variables representing the propensity to internationalization of firms and test it with the overall conceptual process. Second, although self-efficacy and locus of control are major personal attributes to represent human behaviors, including other self-concept traits would reinforce the results. For instance, the need for achievement, networking behavior or the willingness to take risks could be interesting personal attributes to add to the research model. In the future, researchers should consider other self-concept traits in the relationship between digitalization and strategic posture of firms.

Finally, the research encourages scholars in the fields of DE and IE to further develop the overall conceptual process. For instance, by investigating the impact of a specific set of digital technologies on entrepreneurial behaviors, scientific research in IE would provide precise recommendations to enhance the internationalization propensity of firms. As every emerging technology has its own functionalities, it would be interesting to identify how each of them impacts the activities of companies and could offer new opportunities abroad. In addition, since most digital technologies are interactive, it would be fruitful to observe how merging these technologies could improve innovative, proactive and risk-taking behaviors in foreign markets. By focusing on specific emerging technologies, future research in DE would provide a more representative and detailed measure of firms' degree of digitalization. Lastly, because decision-makers are often trapped in traditional and linear thinking, researchers should extend the overall conceptual process by focusing on how patterns of digital technologies change, as well as on the individuals' competencies required in such a context. In that regard, further research is encouraged to develop a construct that would help internationalizing firms to define a digital and entrepreneurial strategy of internationalization. Based on the overall conceptual process, this construct could be a relevant measurement of digital and entrepreneurial orientation of internationalizing firms.

6 REFERENCES

Aagaard, A., Aagaard, A., & Harrison. (2019). Digital Business Models. *Springer International Publishing*.

Ajzen, I. (2002). 'Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior 1'. *Journal of applied social psychology*, 32(4), 665-683.

Andersen, O. (1993). On the internationalization process of firms: A critical analysis. *Journal of international business studies*, 24(2), 209-231.

Anderson, B. S., Covin, J. G., & Slevin, D. P. (2009). Understanding the relationship between entrepreneurial orientation and strategic learning capability: an empirical investigation. *Strategic Entrepreneurship Journal*, 3(3), 218-240.

Anderson, B. S., Kreiser, P. M., Kuratko, D. F., Hornsby, J. S., and Eshima, Y. (2015). 'Reconceptualizing entrepreneurial orientation'. *Strategic management journal*, 36(10), 1579-1596.

Andersson, S., Evers, N., & Kuivalainen, O. (2014). International new ventures: rapid internationalization across different industry contexts. *European Business Review*, 26(5), 390-405.

Autio, E. (2017). 'Digitalisation, Ecosystems, Entrepreneurship and Policy. Perspectives into Topical Issues Is Society and Ways to Support Political Decision Making. Government's Analysis', *Research and Assessment Activities Policy Brief*, 20, 2017.

Autio, E., & Zander, I. (2016). Lean internationalization. In Academy of Management Proceedings (Vol. 2016, No. 1, p. 17420). Briarcliff Manor, NY 10510: *Academy of Management*

Autio, E., Nambisan, S., Thomas, L. D., & Wright, M. (2018). Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems. *Strategic Entrepreneurship Journal*, 12(1), 72-95.

Baldegger, R. J., Hervé, A., & Wild, P. (2019). Swiss International Entrepreneurship Survey (SIES) 2019

Baldegger, R., & Schueffel, P. 2009. Le comportement d'internationalisation des PME suisses: born global et internationalisation progressive. *Revue internationale PME*: Économie et gestion de la petite et moyenne entreprise, 22(1) 9-45.

Banalieva, E. R., & Dhanaraj, C. (2019). Internalization theory for the digital economy. *Journal of International Business Studies*, 1-16.

Bandura, A. (1982). 'Self-efficacy mechanism in human agency'. *American psychologist*, 37(2), 122.

Bandura, A. (1986). Social foundations of thought and action. Englewood Cliffs, NJ, 1986.

Bandura, A. (2006). 'Guide for constructing self-efficacy scales. Self-efficacy beliefs of adolescents', 5(1), 307-337.

Baron, R. M., and Kenny, D. A. (1986). 'The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations'. *Journal of personality and social psychology*, 51(6), 1173.

Baumeister, R. F., & Leary, M. R. (1997). Writing narrative literature reviews. *Review of general psychology*, 1(3), 311-320.

Bell, J., & Loane, S. (2010). 'New-wave'global firms: Web 2.0 and SME internationalisation. *Journal of Marketing Management*, 26(3-4), 213-229.

Bharadwaj, A., El Sawy, O., Pavlou, P., & Venkatraman, N. (2013). Digital business strategy: toward a next generation of insights. *MIS Quarterly* Vol. 37 No. 2, pp. 471-482.

Boone, C., De Brabander, B., and Van Witteloostuijn, A. (1996). 'CEO locus of control and small firm performance: An integrative framework and empirical test'. *Journal of management studies*, 33(5), 667-700.

Boyd, N. G., and Vozikis, G. S. (1994). 'The influence of self-efficacy on the development of entrepreneurial intentions and actions'. *Entrepreneurship theory and practice*, 18(4), 63-77.

Brouthers, K. D., & Hennart, J. F. 2007. Boundaries of the firm: Insights from international entry mode research. *Journal of management*, 33(3): 395-425.

Brouthers, K. D., Geisser, K. D., & Rothlauf, F. (2016). Explaining the internationalization of ibusiness firms. *Journal of International Business Studies*, 1–22.

Brouthers, K. D., Geisser, K. D., & Rothlauf, F. (2018). Explaining the internationalization of ibusiness firms. *International Entrepreneurship*: The Pursuit of Opportunities across National Borders, 217-264.

Brouthers, K. D., Nakos, G., & Dimitratos, P. 2015. SME entrepreneurial orientation, international performance, and the moderating role of strategic alliances. *Entrepreneurship theory and practice*, 39(5): 1161-1187.

Bryman, A. (1984). The debate about quantitative and qualitative research: a question of method or epistemology?. *British journal of Sociology*, 75-92.

Business Office Digital Switzerland (GDS). Biel / Bienne. (2018). « Digital Switzerland » strategy

Chen, C. C., Greene, P. G., and Crick, A. (1998). 'Does entrepreneurial self-efficacy distinguish entrepreneurs from managers? '. *Journal of business venturing*, 13(4), 295-316.

Chen, L., Shaheer, N., Yi, J., & Li, S. (2019). The international penetration of ibusiness firms: Network effects, liabilities of outsidership and country clout. *Journal of International Business Studies*, 50(2), 172-192.

Coviello, N. E., & McAuley, A. (1999). Internationalisation and the smaller firm: A review of contemporary empirical research. *MIR: management international review*, 223-256.

Coviello, N., Kano, L., & Liesch, P. W. (2017). Adapting the Uppsala model to a modern world: Macro-context and microfoundations. *Journal of International Business Studies*, 48(9), 1151-1164.

Covin, J. G., & Miller, D. (2014). International entrepreneurial orientation: Conceptual considerations, research themes, measurement issues, and future research directions. *Entrepreneurship Theory and Practice*, 38(1), 11-44.

Covin, J. G., & Slevin, D. P. (1989). Strategic management of small firms in hostile and benign environments. *Strategic management journal*, 10(1), 75-87.

Covin, J. G., and Slevin, D. P. (1991). 'A conceptual model of entrepreneurship as firm behavior'. *Entrepreneurship Theory and Practice*, Fall, 7 – 25.

Covin, J. G., and Wales, W. J. (2012). 'The measurement of entrepreneurial orientation'. *Entrepreneurship theory and practice*, 36(4), 677-702.

Datta, D. K., Herrmann, P., & Rasheed, A. A. 2002. Choice of foreign market entry modes: Critical review and future directions. *Advances in International Comparative Management*, 14: 85-154.

Davidson, E., & Vaast, E. (2010, January). Digital entrepreneurship and its sociomaterial enactment. In 2010 43rd Hawaii International Conference on System Sciences (pp. 1-10). IEEE.

Davidsson, P. (2015). 'Entrepreneurial opportunities and the entrepreneurship nexus: A re-conceptualization'. *Journal of business venturing*, 30(5), 674-695.

Delios, A. 2017. The death and rebirth (?) of international business research. *Journal of Management Studies*, 54(3): 391-397.

Enjolras, M., Camargo, M., & Schmitt, C. (2019). Are High-Tech Companies More Competitive Than Others? An Empirical Study of Innovative and Exporting French SMEs. *Technology Innovation Management Review*, 9(1).

Etemad, H. (2017). The emergence of online global market place and the multilayered view of international entrepreneurship. *Journal of International Entrepreneurship*, 15(4), 353-365.

Federal Customs Administration (FCA). Bern. 2019. Annual report on Swiss foreign trade.

Forbes, D. P. (2005). 'The effects of strategic decision making on entrepreneurial self–efficacy'. *Entrepreneurship theory and practice*, 29(5), 599-626.

Forsgren, M., & Hagström, P. (2007). Ignorant and impatient internationalization? The Uppsala model and internationalization patterns for Internet-related firms. *Critical perspectives on international business*, 3(4), 291-305.

Foscht, T., Swoboda, B., & Morschett, D. 2006. Electronic commerce-based internationalisation of small, niche-oriented retailing companies: The case of Blue Tomato and the Snowboard industry. *International Journal of Retail & Distribution Management*, 34(7): 556-572.

Gabrielsson, M., & Gabrielsson, P. 2011. Internet-based sales channel strategies of born global firms. *International Business Review*, 20(1): 88-99.

Gankema, H. G. J., Snuif, H. R. and Zwart, P. S (2000) 'The Internationalization Process of Small and Medium Sized Enterprises: An Evaluation of Stage Theory', *Journal of Small Business Management* 38(4): 15–27.

Giones, F., & Brem, A. (2017). Digital technology entrepreneurship: A definition and research agenda. *Technology Innovation Management Review*, 7(5).

Gist, M. E. (1987). 'Self-efficacy: Implications for organizational behavior and human resource management'. *Academy of management review*, 12(3), 472-485.

Gray, J., & Rumpe, B. 2015. Models for digitalization. *Software & Systems Modeling*, 4(14): 1319-1320.

Grégoire, D. A., and Shepherd, D. A. (2012). 'Technology-market combinations and the identification of entrepreneurial opportunities: An investigation of the opportunity-individual nexus'. *Academy of Management journal*, 55(4), 753-785.

Greif, H., Kühnis, N., & Warnking, P. (2017). Digital transformation: How mature are Swiss SMEs.

Gruber, M., MacMillan, I. C., and Thompson, J. D. (2012). 'From minds to markets: How human capital endowments shape market opportunity identification of technology start-ups'. *Journal of management*, 38(5), 1421-1449.

Hagsten, E., & Kotnik, P. (2017). ICT as facilitator of internationalisation in small-and medium-sized firms. *Small Business Economics*, 48(2), 431-446.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate Data Analysis* Vol. 6 Pearson Prentice Hall. Upper Saddle River, NJ.

Hair, N., Wetsch, L. R., Hull, C. E., Perotti, V., and Hung, Y. T. C. (2012). Market orientation in digital entrepreneurship: advantages and challenges in a Web 2.0 networked world. *International Journal of Innovation and Technology Management*, 9(06), 1250045.

Hannibal, M., & Knight, G. (2018). Additive manufacturing and the global factory: Disruptive technologies and the location of international business. *International Business Review*, 27(6), 1116-1127.

Hashai, N., Asmussen, C. G., Benito, G. R., & Petersen, B. 2010. Technological knowledge intensity and entry mode diversity. *Management International Review*, 50(6): 659-681.

Hayes, A. F. (2013). Introduction to mediation, moderation, and conditional process analysis. A regression-based approach. New York, NY: *The Guilford Press*.

Hervé, A., Schmitt, C., & Baldegger, R. (2020). Digitalization, Entrepreneurial Orientation and Internationalization of Micro-, Small- and Medium-Sized Enterprises. *Technology Innovation Management Review*, 10(4): 5-17.

Hervé, A., Schmitt, C., & Baldegger, R. (2020). Internationalization and Digitalization: Applying digital technologies to the internationalization process of small and medium-sized enterprises. *Technology Innovation Management Review*, 10(7).

Hsieh, Y. J., & Wu, Y. J. (2019). Entrepreneurship through the platform strategy in the digital era: Insights and research opportunities. *Computers in Human Behavior*, 95, 315-323.

Hull, C. E., Caisy Hung, Y. T., Hair, N., Perotti, V., & DeMartino, R. (2007). Taking advantage of digital opportunities: a typology of digital entrepreneurship. *International Journal of Networking and Virtual Organisations*, 4(3), 290-303.

Hult, G. T. M., Gonzalez-Perez, M. A., & Lagerström, K. (2020). The theoretical evolution and use of the Uppsala Model of internationalization in the international business ecosystem. *Journal of International Business Studies*, 51(1), 38-49.

Iansiti, M., & Lakhani, K. R. 2017. The truth about blockchain. *Harvard Business Review*, 95(1): 118-127.

Jantunen, A., Puumalainen, K., Saarenketo, S., & Kyläheiko, K. (2005). Entrepreneurial orientation, dynamic capabilities and international performance. *Journal of International Entrepreneurship*, 3(3), 223-243.

Johanson, J., & Vahlne, J. E. (1977). The internationalization process of the firm—a model of knowledge development and increasing foreign market commitments. *Journal of international business studies*, 8(1), 23-32.

Jones, M. V., & Coviello, N. E. (2005). Internationalisation: conceptualising an entrepreneurial process of behaviour in time. *Journal of International Business Studies*, 36(3), 284-303.

Jones, M. V., Coviello, N., & Tang, Y. K. 2011. International entrepreneurship research (1989–2009): a domain ontology and thematic analysis. *Journal of business venturing*, 26(6): 632-659.

Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D., & Buckley, N. 2015. Strategy, Not Technology, Drives Digital Transformation. *MIT Sloan Management Review and Deloitte University Press*.

Keupp, M. M., & Gassmann, O. (2009). The past and the future of international entrepreneurship: a review and suggestions for developing the field. *Journal of Management*, 35(3), 600-633.

Khedhaouria, A., Gurău, C., and Torrès, O. (2015). 'Creativity, self-efficacy, and small-firm performance: the mediating role of entrepreneurial orientation'. *Small Business Economics*, 44(3), 485-504.

Knight, G. A. 2001. Entrepreneurship and strategy in the international SME. *Journal of international management*, 7(3): 155-171.

Knight, G. A., & Cavusgil, S. T. (1996). The born global firm: A challenge to traditional internationalization theory. *Advances in International Marketing*, 8: 11–26.

Knight, G. A., & Liesch, P. W. (2016). Internationalization: From incremental to born global. *Journal of World Business*, 51(1), 93-102.

Knight, G.A., & Cavusgil, S.T. 2004. Innovation, organizational capabilities, and the born-global firm. *Journal of International Business Studies*, 35(2): 124–141.

Kollmann, T. and Christofor, J. (2014), "International entrepreneurship in the network economy: internationalization propensity and the role of entrepreneurial orientation", *Journal of International Entrepreneurship*, Vol. 12 No. 1, pp. 43-66.

Kor, Y. Y., Mahoney, J. T., and Michael, S. C. (2007). 'Resources, capabilities and entrepreneurial perceptions'. *Journal of management studies*, 44(7), 1187-1212.

Kraus, S., Palmer, C., Kailer, N., Kallinger, F. L., & Spitzer, J. (2019). Digital entrepreneurship: a research agenda on new business models for the twenty-first century. *International Journal of Entrepreneurial Behavior & Research*, 25(2), 353-375.

Krauss, S. I., Frese, M., Friedrich, C., and Unger, J. M. (2005). 'Entrepreneurial orientation: A psychological model of success among southern African small business owners'. *European journal of work and organizational psychology*, 14(3), 315-344.

Kriz, A., & Welch, C. (2018). Innovation and internationalisation processes of firms with new-to-the-world technologies. *Journal of International Business Studies*, 49(4), 496-522.

Kuivalainen, O., Sundqvist, S., & Servais, P. 2007. Firms' degree of born-globalness, international entrepreneurial orientation and export performance. *Journal of world business*, 42(3): 253-267.

Le Dinh, T., Vu, M. C., & Ayayi, A. (2018). Towards a living lab for promoting the digital entrepreneurship process. *International Journal of Entrepreneurship*.

Le Moigne, J. L. (1995). Les épistémologies constructivistes (Vol. 2969). Paris: Presses universitaires de France.

Legner, C., Eymann, T., Hess, T., Matt, C., Böhmann, T., Drews, P., ... & Ahlemann, F. (2017). Digitalization: opportunity and challenge for the business and information systems engineering community. *Business & information systems engineering*, 59(4), 301-308

Levenson, H. (1974). 'Activism and powerful others: Distinctions within the concept of internal-external control'. *Journal of personality assessment*, 38(4), 377-383.

Li, L., Su, F., Zhang, W., & Mao, J. Y. (2018). Digital transformation by SME entrepreneurs: A capability perspective. *Information Systems Journal*, 28(6), 1129-1157.

Li, Y. H., Huang, J. W., and Tsai, M. T. (2009). 'Entrepreneurial orientation and firm performance: The role of knowledge creation process'. *Industrial marketing management*, 38(4), 440-449.

Lu, J. W., & Beamish, P. W. (2001). The internationalization and performance of SMEs. *Strategic management journal*, 22(6-7), 565-586.

Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of management Review*, 21(1), 135-172.

Lumpkin, G. T., & Dess, G. G. 2004. E-business strategies and internet business models: How the internet adds value. *Organizational Dynamics*, 33(2): 161-173.

MacKinnon, D. P., Fairchild, A. J., and Fritz, M. S. (2007). 'Mediation analysis'. *Annual Review of Psychology*, 58, 593–614.

Malhotra, N. K., Agarwal, J., & Ulgado, F. M. 2003. Internationalization and entry modes: a multitheoretical framework and research propositions. *Journal of international marketing*, 11(4): 1-31.

Manyika, J., Lund, S., Bughin, J., Woetzel, J. R., Stamenov, K., & Dhingra, D. 2016. Digital globalization: The new era of global flows (Vol. 4). San Francisco: McKinsey Global Institute.

Mathews, S., Bianchi, C., Perks, K. J., Healy, M., & Wickramasekera, R. 2016. Internet marketing capabilities and international market growth. *International Business Review*, 25(4): 820-830.

Matt, C., Hess, T., & Benlian, A. (2015). Digital transformation strategies. *Business & Information Systems Engineering*, 57(5), 339-343.

McAuley, A. (2010). Looking Back, Going Forward: Reflecting on Research into the SME Internationalisation Process. *Journal of Research in Marketing and Entrepreneurship* 12 (1): 21–41.

McDougall, P. P., & Oviatt, B. M. (2000). International entrepreneurship: the intersection of two research paths. *Academy of management Journal*, 43(5), 902-906.

McGee, J. E., and Peterson, M. (2019). 'The long-term impact of entrepreneurial self-efficacy and entrepreneurial orientation on venture performance'. *Journal of Small Business Management*, 57(3), 720-737.

McGee, J. E., Peterson, M., Mueller, S. L., and Sequeira, J. M. (2009). 'Entrepreneurial self-efficacy: refining the measure'. *Entrepreneurship theory and Practice*, 33(4), 965-988.

Miller, D. (1983). 'The correlates of entrepreneurship in three types of firms'. *Management science*, 29(7), 770-791.

Miller, D., and Friesen, P. H. (1982). 'Innovation in conservative and entrepreneurial firms: Two models of strategic momentum'. *Strategic management journal*, 3(1), 1-25.

Monaghan, S., Tippmann, E., & Coviello, N. (2019). Born digitals: Thoughts on their internationalization and a research agenda. *Journal of International Business Studies*, 1-12.

Morua, J., Marin A., Schmitt C. 2015. Through a dynamical representation of the firm to manage the complexity of innovation strategy, The 19th world multi-conference on systemics, cybernetics and informatics: WMSCI 2015, July 12 - 15, Orlando, Florida, USA.

Mueller, S. L., and Thomas, A. S. (2001). 'Culture and entrepreneurial potential: A nine country study of locus of control and innovativeness'. *Journal of business venturing*, 16(1), 51-75.

Nambisan, S. (2017). Digital entrepreneurship: Toward a digital technology perspective of entrepreneurship. *Entrepreneurship Theory and Practice*, 41(6), 1029-1055.

Neo, B. S. (1988). 'Factors facilitating the use of information technology for competitive advantage: An exploratory study'. *Information & Management*, 15(4), 191-201.

Neubert, M. (2018). The Impact of Digitalization on the Speed of Internationalization of Lean Global Startups. *Technology Innovation Management Review*, 8(5).

Nummela, N., S. Loane, & J. Bell. (2006). Change in sme Internationalisation: an Irish Perspective. *Journal of Small Business and Enterprise Development* 13 (4): 562–83.

Ojala, A., Evers, N., & Rialp, A. (2018). Extending the international new venture phenomenon to digital platform providers: A longitudinal case study. *Journal of World Business*, 53(5), 725-739.

Oviatt, B. M., & McDougall, P. P. (1994). Toward a theory of international new ventures. *Journal of international business studies*, 25(1), 45-64.

Oviatt, B. M., & McDougall, P. P. (1995). Global start-ups: Entrepreneurs on a worldwide stage. *Academy of Management Perspectives*, 9(2), 30-43.

Oviatt, B. M., & McDougall, P. P. (2005). Defining international entrepreneurship and modeling the speed of internationalization. *Entrepreneurship theory and practice*, 29(5), 537-553.

Pagani, M. 2013. Digital business strategy and value creation: Framing the dynamic cycle of control points. *Mis Quarterly*, 37(2).

Park, Y. S., Konge, L., & Artino Jr, A. R. (2020). The positivism paradigm of research. *Academic Medicine*, 95(5), 690-694.

Perez, Y. A. (2008). La pratique de la recherche-intervention dans les organisations: retour sur les modes de production des connaissances gestionnaires à partir du terrain. Humanisme et entreprise, (3), 101-113.

Poon, J. M., Ainuddin, R. A., and Junit, S. O. H. (2006). 'Effects of self-concept traits and entrepreneurial orientation on firm performance'. *International small business journal*, 24(1), 61-82.

Porter, M. E. (1985). 'Technology and competitive advantage'. *The Journal of Business Strategy*, 5(3), 60.

Porter, M. E., & Heppelmann, J. E. (2015). How smart, connected products are transforming companies. Harv*ard Business Review*, 93(10), 96-114.

Powell, T. C., and Dent-Micallef, A. (1997). 'Information technology as competitive advantage: The role of human, business, and technology resources'. *Strategic management journal*, 18(5), 375-405.

Rauch, A., and Frese, M. (2007). 'Let's put the person back into entrepreneurship research: A meta-analysis on the relationship between business owners' personality traits, business creation, and success'. *European Journal of work and organizational psychology*, 16(4), 353-385.

Rauch, A., Wiklund, J., Lumpkin, G. T., and Frese, M. (2009). 'Entrepreneurial orientation and business performance: An assessment of past research and suggestions for the future'. *Entrepreneurship theory and practice*, 33(3), 761-787.

Recker, J., and von Briel, F. (2019). 'The Future of Digital Entrepreneurship Research: Existing and Emerging Opportunities'.

Rennie, M. W. (1993). Born global. *The McKinsey Quarterly*, (4), 45-53.

Reuber, A.R., & Fischer, E. 2011. International entrepreneurship in internet-enabled markets. *Journal of Business Venturing*, 26(6): 660-679.

Reuber, A.R., Fischer, E., & Morgan-Thomas, A. 2014. Understanding eINVs through the lens of prior research in entrepreneurship, international business and international entrepreneurship. *The Routledge companion to international entrepreneurship*: 165-185.

Reuber, A. R., Knight, G. A., Liesch, P. W., & Zhou, L. 2018. International entrepreneurship: The pursuit of entrepreneurial opportunities across national borders. *Journal of International Business Studies*.

Rialp, A., Rialp, J., & Knight, G. A. 2005. The phenomenon of early internationalizing firms: what do we know after a decade (1993–2003) of scientific inquiry?. *International business review*, 14(2): 147-166.

Ross, J. W., Sebastian, I., Beath, C., Mocker, M., Moloney, K., and Fonstad, N. (2016). 'Designing and executing digital strategies'.

Ross, J., Beath, C., Sebastian, I. (2017). Digitized ≠ Digital. MIT Center for Information Systems Research. *Research briefing*. Volume XVII, Number 10.

Rotter, J. B. (1966). 'Generalized expectancies for internal versus external control of reinforcement'. *Psychological monographs: General and applied*, 80(1), 1.

Rüßmann, M., Lorenz, M., Gerbert, P., Waldner, M., Justus, J., Engel, P., & Harnisch, M. 2015. Industry 4.0: The future of productivity and growth in manufacturing industries. Boston Consulting Group, 9(1): 54-89.

Ruzzier, M., Hisrich, R. D., & Antoncic, B. (2006). SME internationalization research: past, present, and future. *Journal of small business and enterprise development*, 13(4), 476-497.

Sapp, S. G., and Harrod, W. J. (1993). 'Reliability and validity of a brief version of Levenson's locus of control scale'. *Psychological Reports*, 72(2), 539-550.

Schallmo, D., Williams, C. A., and Boardman, L. (2017). 'Digital transformation of business models—Best practice, enablers, and roadmap'. *International Journal of Innovation Management*, 21(08), 1740014.

Schumpeter, J. (1934). 'The theory of economic development'. *Harvard University Press*. Cambridge, MA.

Schwab K. 2017. The Fourth Industrial Revolution. World Economic Forum. Edition Dunod.

Sebastian, I. M., Ross, J. W., Beath, C., Mocker, M., Moloney, K. G., & Fonstad, N. O. 2017. How Big Old Companies Navigate Digital Transformation. *MIS Quarterly Executive*.

Shane, S. (2000). 'Prior knowledge and the discovery of entrepreneurial opportunities'. *Organization science*, 11(4), 448-469.

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. Journal of Business Research, 104, 333-339.

Stallkamp, M., & Schotter, A. P. (2018). Platforms without borders? The international strategies of digital platform firms. *Global Strategy Journal*.

Strange, R., & Zucchella, A. (2017). Industry 4.0, global value chains and international business. *Multinational Business Review*, 25(3), 174-184.

Sullivan, D., & Bauerschmidt, A. (1990). Incremental internationalization: a test of Johanson and Vahlne's thesis. *MIR: Management International Review*, 19-30.

Tanev, S., Rasmussen, E.S., Zijdemans, E., Lemminger, R., & Svendsen, L.L. 2015. Lean and global technology start-ups: linking the two research streams. *International Journal of Innovation Management*, 19(03): 1540008.

Tiessen, J.H., Wright, R.W., & Turner, I. 2001. A model of e-commerce use by internationalizing SMEs. *Journal of International Management*, 7(3): 211-233.

Tilson, D., Lyytinen, K., & Sørensen, C. (2010). Research commentary-Digital infrastructures: The missing IS research agenda. *Information systems research*, 21(4), 748-759.

Vahlne, J. E., & Johanson, J. (2017). From internationalization to evolution: The Uppsala model at 40 years. *Journal of International Business Studies*, 48(9), 1087-1102.

von Briel, F., Davidsson, P., and Recker, J. (2018). 'Digital technologies as external enablers of new venture creation in the IT hardware sector'. *Entrepreneurship Theory and Practice*, 42(1), 47-69.

Watson, G., Weaven, S., Perkins, H., Sardana, D., & Palmatier, R. (2018). International Market Entry Strategies: Relational, Digital, and Hybrid Approaches. *Journal of International Marketing*, 26(1), 30-60.

Weinman, J., and Euchner, J. (2015). 'Digital Technologies and Competitive Advantage'. *Research-Technology Management*, 58(6), 12-17.

Welch, C., & E. Paavilainen Mäntymäki. (2014). Putting Process (back) in: Research on the Internationalisation Process of the Firm. *International Journal of Management Reviews* 16 (1): 2–23.

Welch, C., Nummela, N., & Liesch, P. (2016). The internationalization process model revisited: An agenda for future research. *Management International Review*. Volume 56, Issue 6, pp 783–804.

Welte, J. 2019. Structure of Swiss SMEs in 2017. Federal Statistical Office (FSO), Neuchatel.

Westerman, G., Calméjane, C., Bonnet, D., Ferraris, P., & McAfee, A. 2011. Digital Transformation: A roadmap for billion-dollar organizations. MIT Center for Digital Business and Capgemini Consulting, 1-68.

Wijbenga, F. H., and van Witteloostuijn, A. (2007). 'Entrepreneurial locus of control and competitive strategies–The moderating effect of environmental dynamism'. *Journal of Economic Psychology*, 28(5), 566-589.

Wiklund, J. (1999). 'The sustainability of the entrepreneurial orientation—performance relationship'. *Entrepreneurship theory and practice*, 24(1), 37-48.

Witten, I. H., Frank, E., Hall, M. A., & Pal, C. J. 2016. Data Mining: Practical Machine Learning Tools and Techniques. Cambridge, MA: Morgan Kaufmann.

Wittkop, A., Zulauf, K., & Wagner, R. (2018). How digitalization changes the internationalization of entrepreneurial firms: theoretical considerations and empirical evidence. *Management Dynamics in the Knowledge Economy*, 6(2), 193-207.

Wood, R., and Bandura, A. (1989). 'Social cognitive theory of organizational management'. *Academy of management Review*, 14(3), 361-384.

Zahra, S. A., & George, G. (2002). International entrepreneurship: The current status of the field and future research agenda. *Strategic entrepreneurship: Creating a new mindset*, 255-288.

Zahra, S. A., Korri, J. S., & Yu, J. (2005). Cognition and international entrepreneurship: implications for research on international opportunity recognition and exploitation. *International business review*, 14(2), 129-146.

Zhao, H., Seibert, S. E., and Hills, G. E. (2005). 'The mediating role of self-efficacy in the development of entrepreneurial intentions'. *Journal of applied psychology*, 90(6), 1265.

Ziyae, B., Sajadi, S. M., & Mobaraki, M. H. (2014). The deployment and internationalization speed of e-business in the digital entrepreneurship era. *Journal of Global Entrepreneurship Research*, 4(1), 15.