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The Oxymoron of Digitalization:
A Resource-Based Perspective

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ABSTRACT

How do small and medium-sized enterprises (SMEs) perceive the prerequisites and critical factors of digitalization? The objective of this article is to map SMEs' digital maturity and their views on how to manage the opportunities and challenges brought about by digitalization in order to foster competitiveness in local, regional, national, and international contexts. The study draws on a resource-based perspective, which views the firm as a unique bundle of assets and resources that, if utilized in distinctive ways, can create competitive advantage. The study builds on triadic relations as an interactive learning process that occurs in the interaction between actors as the concept of open innovation postulates. This study was conducted as an interpretative phenomenological analysis (IPA) study of SMEs and actors in innovation system in Gävleborg County in Sweden. It uses a qualitative approach featuring in-depth interviews, workshops, and focus-group interviews. The findings suggest a digital divide between SMEs, with a discrepancy in opportunities to benefit from the digitalization potential among the population studied. The divide manifests itself through economics, usability, and empowerment. Digitalization should not be viewed as merely a technology issue, but as a better way to run a business, as a platform for development and dissemination of knowledge about the critical factors for increased competitiveness that creates competitive values in production with digitalization as a starting point and creates an understanding of the how and what creates competitiveness in each critical factor.

KEYWORDS

Digitalization, Dynamic Capability, Resource-Based Perspective, Small and Medium-Sized Enterprises (SMEs)

INTRODUCTION

Since the publication of Alfred Chandler's *Strategy and Structure* (1962), *The Visible Hand* (1977) and *Scale and Scope* (1990), researchers of business policy and organizations have claimed that a firm's strategy, structure, and managerial processes must 'fit' with one another (Teece, 1993). They have also accentuated the difficulties in achieving this fit and, in particular, the problems of changing an organization's design and processes to fit new environments or strategies. We live today in a physical as well as a virtual world. In our virtual world, we release a tremendous amount of data (Ivang et al., 2009; Hagberg et al., 2016). Digitalization is the integration of digital technologies into everyday life, which means computerization of systems and jobs for better ease and accessibility (Mahaldar &

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Bhadra, 2015). Consequently, adoption of digital technologies has profound implications for business practices, including marketing planning and implementation to support the change of the business model. Through linkage, the internet of things (IoT) facilitates productivity in society, which reduces our environmental footprint (Holmlund et al., 2017). Many are of the opinion that it offers us a chance to put a stop to our current carbon-based civilization and reset to a renewable and sustainable society.

Swedish industry has been automated within living memory (Holmlund et al., 2017), and the digital maturity of firms in their internationalization endeavours is an important issue. This is of particular importance in the case of small and medium-sized enterprises, which produce their goods and services for export at production sites in Sweden to a much larger degree than multinational companies do, and are more susceptible to new digital, foreign competitors situated in local markets than the multinational enterprises are.

Our research does not conceptualize digitalization as merely a technology issue – as commonly envisaged (Caputo et al., 2018). Digitalization is viewed as an approach and a capability to create value by means of existing and new technologies. Nevertheless, the capability to exploit the benefits of digitalization and manage its challenges varies on a national and sectoral basis (Fremont, Eklinder-Frick, Åge & Osarenkhoe, 2018; Eklinder-Frick et al., 2020). That is to say, the capability to utilize gathered data for something more than just reducing production costs. According to Teece et al. (1997), three dynamic capabilities are necessary in order to meet new challenges. Organizations and their employees need the capability to learn quickly and to build strategic assets. New strategic assets such as capability, technology, and customer feedback have to be integrated into the company. Existing strategic assets have to be transformed or reconfigured.

Against this background, it is pertinent to mention that firms use digital transformation in different ways. Some use it to improve the internal organizing process of innovation and operate more efficiently and effectively (Adak, 2015). Others use it to refine the way they connect to- and collaborate with consumers, product suppliers, and other firms, even when the latter are rivals (Andersson & Mattsson, 2016). Still others leverage digital transformation to build two-sided platforms and remodel their role and impact in entire industries by changing the rules of competition (Martínez-García, 2013). These benefits do not come without challenges, however, and may hide important trade-offs (Cennamo & Santalo 2015; Fremont et al., 2018).

The basic tenet upon which this paper rests, which differentiates it from extant literature, is a recognition that digitalization is an oxymoron, i.e. paradoxical. This is due largely to the fact that as long as the development of digitalization is based on technology that is equally available all over the world, but at the same time hampered by a firm's capability to utilize its benefits, it might, from a Swedish perspective, be viewed as a threat, yet also as a great opportunity. In order to determine the availability of research in the area, a systematic literature review was carried out using the PRISMA guidelines (Moher et al., 2009). The selection process ultimately yielded two relevant articles (Eklinder-Frick et al 2018 and Fremont et al., 2020). Neither of the two discussed the prerequisites and critical factors (the positive and dark sides of the phenomena) from SMEs perspective. Their emphasis is on controversy and friction as well as inter-organizational challenges within digitalization efforts prevailing in multinational national enterprises. This emphasizes the need of further research.

The exploratory nature of this study is guided by the following research question: How do small and medium-sized enterprises (SMEs) perceive the prerequisites and critical factors of digitalization? Thus, this paper aims to map the digital maturity of SMEs and their views on how to manage the opportunities and challenges brought about by digitalization, in order to foster competitiveness in local, regional, national and international contexts.

The paper is organized as follows: following this introduction is the reviews the relevant literature to provide a theoretical background for the study; Thereafter, we present the methodology on which research design and data collection is based; Then findings are presented which ends with framework depicting the theoretical point of departure and findings from the research project on which this study

is based. Finally, the topography is used to anchor the discussion of findings and to draw conclusions and implications as well as limitations and avenues for future research.

THEORETICAL BACKGROUND

Industry 4.0 focuses on the establishment of intelligent products and production processes that rely on the gathering and use of big data (Brettel et al., 2014; Prashant et al., 2013). Cyber-physical system-based manufacturing and service innovations are two inevitable trends and challenges for manufacturing industries (Lee & Kao, 2014). The process of digitalization is defined as the pervasive adoption of a wide variety of digital, real-time, and networked technologies, products and services (Kutsikos et al., 2014) that enable people, companies, governments and machines to stay connected and communicate with one another, to gather, analyse, and exchange massive amounts of information on all kinds of activities – and the economic and societal impacts of these activities (Martínez-García, 2013). However, such benefits are not yet evenly distributed among different nations, markets, or industries.

According to Tiago and Verissismo (2014), the proliferation of online social networks is one of the biggest changes in human interaction. This paper builds on triadic relations as an interactive learning process that occurs in the interaction between actors as the concept of open innovation postulates (Chesbrough, 2003; Chesbrough et al., 2006; Fagerberg, 1995; Van de Ven et al., 1999; Waluszewski, Baraldi, Linné & Shih, 2009), and that innovation is born out of reshuffling resources inside and outside of the firm and takes into consideration the mutual value creation of the innovators involved. This triadic logic rests on the assumption that the methods of strategy and its central questions steam from the definition of business strategy as concerned with a match between the internal capabilities of a company and the company's external environment (Hunt & Lambe, 2000; Chandler, 1962; Hamel & Prahalad, 1989).

Resource-Based View

The Theory of the Growth of the Firm (Edith Penrose, 1959): Why do some firms perform better than others? What enables a firm to grow and take advantage of its opportunities? "The Theory of the Growth of the Firm" addresses these questions and laid the foundation for this approach often referred to as the "resource based view of the firm." The proliferation of online social networks is one of the biggest changes of our time (Tiago & Verissismo, 2014). Hence, as noted above, this study builds on triadic relations as an interactive learning process that occurs in the interaction between actors, as postulated by open innovation (Chesbrough, 2003; Abrahamson, Havenvid & La Rocca, 2017), and that innovation is born out of reshuffling resources inside and outside of the firm and considers the mutual value creation of those involved. This is in line with the dynamic capability perspective, which evolved from the resource-based view (RBV) (Helfat & Peteraf, 2003; Bowman & Ambrosini, 2003). While RBV focuses on the identification and choice of resources, the dynamic capability perspective stresses resource deployment and capability building to adapt to changes in technologies and customers (Helfat & Peteraf, 2003). The attributes that constitute RBV are thus at parity with the dynamic capability perspective, which depicts a firm's ability to "integrate, build and reconfigure internal and external competences to address rapidly changing environments" (Teece, Pisano & Shuen, 1997).

As noted, this paper draws on the *resource-based perspective*, which views the firm as a unique bundle of assets and resources that, if utilized in distinctive ways, can create competitive advantage (Barney, 1991, 1995; Conner, 1991; Peteraf, 1993). Key resources therefore determine the competitive advantage that a firm is endowed with. According to Conner (1991) and Barney (1999), a resource with the potential to boost competitive advantage must exhibit valuable, rare, imperfectly imitable and non-substitutable – VRIN – attributes.

The resource-based perspective was later extended to include additional elements. Milgrom and Roberts (1995), for example, leveraged the concept of complementarity to further explain the role of a firm's resources and how these resources contribute to business value. The value of an organizational resource can increase in the presence of other complementary resources because it is difficult for competitors to copy the total effect (Bhatt & Grover, 2005; Bharadwaj et al., 2007; Liang, You & Liu, 2010). In other words, the joint value of complementary resources is higher than the sum total of their individual values. As far as research on a contemporary issue like digitalization is concerned, IT is increasingly viewed as a complementary resource that enhances the value of other organizational resources and capabilities (Bharadwaj et al., 2007).

From Knowledge Assets to Dynamic Capabilities

Porter's (1980) five forces framework, which applied the structure-performance paradigm of industrial organization economics to strategy, focused on evaluating suppliers and customers, as well as the threat of new entrants and/or substitute products. Others have since noted that while this framework holds insight, it is not up to the task of revealing the dominant logic of value capture in most new industries, or in many older ones. Such changes in the economy necessitate "a new theoretical framework for understanding and guiding the growth of firms increasingly involved in creating and marketing conceptual, rather than physical, products" and the dynamic capabilities framework "recognizes these considerations" (Teece et al., 1997; Teece, 2007). Sustainable competitiveness and growth of SMEs are increasingly determined by their capability to make use of digital technologies which are generating opportunities for developing new growth routes based on digitization (North et al., 2019).

Having evolved from the resource-based view (Bowman & Ambrosini, 2003), which focuses on resource identification and resource choice, the dynamic capabilities perspective stresses resource deployment and capability-building to adapt to changes in technologies and customers (Helfat & Peteraf, 2003). The attributes that constitute RBV are thus at parity with the dynamic capabilities perspective, which depicts a firm's ability to "integrate, build and reconfigure internal and external competences to address rapidly changing environments" (Teece, Pisano & Shuen, 1997). Dynamic capabilities are distinguished from operational capabilities, which pertain to the current operations of an organization. Dynamic capabilities, in contrast, refer to "the capacity of an organization to purposefully create, extend, or modify its resource base" (Helfat et al., 2007). Based on the literature and an explorative study of 235 small- and medium-sized firms, Borch and Madsen (2007) developed four categories of dynamic capabilities that facilitate innovative strategies in SMEs: internal and external reconfiguration and integration capabilities, resource acquisition capability, learning network capabilities and strategic path aligning capabilities.

Luo (2000) identifies three critical components of dynamic capabilities: being endowed with distinctive resources (capability possession); allocating distinctive resources (capability deployment); and dynamic learning and building new capabilities (capability upgrading). Wang and Ahmed (2007) list three main factors: adaptive capabilities (the ability of a firm to identify and utilize potential market opportunities); absorptive capabilities (a firm's ability to learn from partners, to integrate external information and transform it into firm-embedded knowledge); and innovative capabilities (the ability to develop new products and/or markets through alignment of strategic innovative orientation with innovative behaviours and processes). According to Liu and Hsu (2011), dynamic capabilities consist of two components: capability exploitation, which entails how a firm exploits rent-generating resources that are firm-specific, difficult to imitate, and have the ability to generate abnormal returns; and capability upgrading, which depicts how the firm engages in building new capabilities through learning from organizations, creating new skills, or revitalizing existing skills in new circumstances.

Dynamic Capabilities: Clusters of Activities

The basic assumption of the dynamic capabilities framework is that core competencies should be used. According to Teece et al. (1997), the framework entails three categories of activities and adjustments:

1) identification and assessment (or *sensing*) of an opportunity, where sensing comprises an inherently entrepreneurial set of capabilities that involves exploring technological opportunities, probing markets, and listening to customers, along with scanning the other elements of the business ecosystem (Teece, 2007); 2) mobilization (or *seizing*) of resources to address an opportunity and to capture value from doing so, where seizing capabilities includes designing business models to satisfy customers and capture value, including securing access to capital and the necessary human resources (employee motivation is vital), and forging strong external relationships with suppliers, complementors, and customers (Barile, Vincenza Ciasullo, Troisi & Sarno, 2017); and 3) continued renewal – *transforming* (Tseng & Lee, 2014). Although some firms will better than others at performing some or all of these tasks, if a firm is to sustain itself as markets and technologies change, these activities are required.

METHODOLOGY

Research Design

To tackle the overarching research question that this study aims to answer – how the unit of analysis the firm under study – perceives the prerequisites and critical factors of digitalization – a qualitative phenomenological study (Hesse-Biber and Leavy, 2011; Moustakas, 1994; Pietkiewicz and Smith, 2014) was deemed most appropriate. A qualitative approach facilitates a deeper understanding of the actors' interactions, sentiments and behaviours that occur during the research process (Borghini et al., 2010). An exploratory study approach was elected as the intention was to elucidate the causal mechanisms of how the actors from different business sectors perceived the prerequisites and critical factors of digitalization. In order to determine the availability of research in the area, a systematic literature review was carried out using the PRISMA guidelines (Moher et al., 2009). The selection process ultimately yielded two relevant articles (Eklinder-Frick et al 2018 and Fremont et al., 2020). Neither of the two discussed the prerequisites and critical factors (the positive and dark sides of the phenomena) from SMEs perspective. Their emphasis is on controversy and friction as well as inter-organizational challenges within digitalization efforts prevailing in multinational national enterprises. This emphasizes the need of further research.

Study Participants

This study was conducted with the financial support of European regional development fund (ERDF) and regional partners such as cluster organizations in northern central Sweden, Region Gävleborg and the Swedish Agency for Economic and Regional Growth. Consequently, interviewees were chosen using purposive sampling (Oliver, 2006). Actors from regional innovations system in Gävleborg county (50 companies, four cluster organizations, two municipalities in Gävleborg county and one official from middle Sweden Chamber of Commerce) that participated in the activities (workshops and seminars) conducted in the (ERDF) 2017 – 2020 were contacted via e-mail, or similar electronic channel with a request to participate in an interview upon which all of the individuals, representing various business sectors and innovation system accepted. The interviewees were granted full anonymity and were provided with information regarding the purpose of the study, which was communicated as investigating h*ow small and medium-sized enterprises (SMEs) perceive the prerequisites and critical factors of digitalization?* The selection criteria were that the interviewees had a managerial role in the company and other innovation system, as well as deep insight in the digitalisation process (Chatman, 1991).

Data Collection

Data collected was both retrospective and real-time, as the investigations were ongoing during the time data collection took place (Eisenhardt & Graebner, 2007) – though out the lifespan of the ERDF project. The face-to-face interviews were conducted in the form of dialogue and enabled us

to pose follow-up questions or ask for clarification, and to record also non-verbal clues. Moreover, experience-based seminars and workshops will be held on how SMEs can manage critical factors, and thereby create competitive value in their business processes, using digitalization as a starting point. The seminars will furthermore help to create an understanding of how and what it is that creates competitiveness for each critical factor. The transcribed interviews were analysed by extracting key concepts from the data collected.

Three workshops were carried out in the form of five 3-hour focus-group discussions conducted with the respondents (see study participants above). Each group was limited to at most eight members representing various sectors and facets of the innovation system in Gävleborg county. A moderator served to encourage a free flow of viewpoints on the main theme for discussion (David & Sutton, 2004) that probed both the positive- and the dark sides of digitalization. Specifically, the focus of the interview guide was on h*ow small and medium-sized enterprises (SMEs) perceive the prerequisites and critical factors of digitalization*. The discussions were videotaped and later transcribed. Each focus group was required to come up with a joint communiqué of, at most, 500 words that aptly depicted the main theme of the focus group's discussion: the positive- and dark sides of digitalization *and their views on how to manage the opportunities and challenges brought about by digitalization in order to foster competitiveness.* Why some firms perform better than other firms? In addition, what enables a firm to grow and take advantage of its opportunities? The joint communiqués, which also form the basis for our findings, therefore represent verbatim reports from the six discussion groups, and excerpts from the communiqués are presented as findings.

Data Analysis

The study engaged a hermeneutic, inductive, Interpretative Phenomenological Analysis (IPA) (Smith, 2007; Pietkiewicz and Smith, 2014). This was because the intent was to scrutinise patterns across data sets in order to describe the phenomenon emanating from the study's research question, i.e. h*ow do small and medium-sized enterprises (SMEs) perceive the prerequisites and critical factors of digitalization?* (Guest, 2012). IPA's hermeneutic stance is sense making and "bottom-up", as the analysis was generated from data extracted from the interviewees rather than matching the data to patterns from a pre-existing theory (Larkin et al., 2006). The focus group interviews and the face-to-face interviews facilitated a somewhat limited sample size. This makes IPA an appropriate approach as it probes deeper into the meanings and perceptions of the respondents (Reid et al., 2005). Following IPA, the data extrapolated from the interviews have subsequently been The data collected was analysed in three steps: data reduction, data display, and conclusion-drawing (Miles & Huberman, 1994). Data reduction entails selecting and excluding/filtering the data in order to focus, discard and organize it in such a way that conclusions can be drawn and verified (ibid.). With respect to the audio- and video-recorded interviews, this analysis process began while transcribing the interviews. The aim of data display is to organize the data into a compressed assembly of information to elucidate appropriate conclusions and implications.

FINDINGS

Digital maturity is relatively low among the majority of SMEs in Gävleborg County, but many companies are able to see the benefits of being/becoming digital in their operations. At the same time, there are noticeable differences between companies. For many of the SMEs, digitalization equals technology or IT, and they do not understand how their operations would be influenced by digitalization since they do not develop technology or provide IT solutions. Furthermore, there is more uncertainty among the SMEs about digitalization than about internationalization and sustainability reporting. Internationalization is associated with new opportunities in foreign markets, and is therefore welcomed by the companies. The majority of respondents in the study believe that digitalization is "associated with uncertainty, as well as costs being part of the picture."

The concept of "digital transformation" can encompass very different elements. For some respondents, the digital revolution is merely a consequence of the fundamental relationship between supply and demand. For others, digitalization enables them: "to match supply and demand smarter, simpler, and cheaper, as well as more efficiently" and helps "to make value chains more streamlined, at the same time as lowering the transaction costs."

During the latter half of the 20th century, the digital revolution led to changes brought about by improved communication technology and digital computing. Despite the fact that the digital revolution has significantly modernized the way things are done, however, the respondents raised concerns about the emergence of the digital world. As such, the digital revolution can be interpreted as a iniquitous problem in the following scenarios identified by the focus group.

Joint Communiqué From Group 1

The digital revolution has led to increased electronic commerce and mobile commerce. This development has also resulted in an increase in Internet fraud (Rubin 2006). Without proper skills and knowledge of how to effectively use the Internet, consumers face risks by failing to identify potential theft and online tools being used to phish for their personal information. Given the nature of online transactions, it is easier for fraudsters to disguise themselves and mislead unsuspecting consumers into sending them their financial information.

Joint Communiqué From Group 2

Information sharing and privacy has become a general concern in the digital revolution. The ability of the digital platform to store large volumes of data presents opportunities for unauthorized tracking of an individual's activities and interests. Without careful application of digital technology, there is a risk that people can collect substantial personal information that can be used to create a profile for individuals. This information can be used for fraudulent purposes such as selling such profiles to marketing agencies without the user's knowledge.

Joint Communiqué From Group 3

The digital revolution also led to the emergence of copyright infringement and trademark issues. The ability of consumers to illegally reproduce and distribute original works, which are protected, has dramatically changed the phenomenon of intellectual property. Copyright infringement is critical, especially in the film, music and television industries (Rubin 2006). With regard to this, individuals that struggle to produce their intellectual innovations are not well-compensated for their efforts. Instead, unscrupulous individuals take full benefit of this hard work by reproducing and redistributing these materials without permission. This was also similar to Joint communiqué from Group 5 who also said that the digital revolution led to increased copyright infringement and trademark issues.

Joint Communiqué From Group 4

Businesses can take advantage of the digital divide to increase their market operations and hence profitability. For instance, organizations can stimulate business growth in marginalized areas by outsourcing their services to others, such as call centres, data processing and other professional services. These initiatives naturally require an initial investment to train this population in the use of digital technology. After the necessary skills are acquired by the disadvantaged community, businesses can then begin to roll out their operations on a commercial basis. This move serves to characterize an organization's presence and goodwill in these areas for a considerable period of time. Similarly, these organizations could commercialize the educating of the disadvantaged communities in information technology and computer literacy.

Joint Communiqué From Group 6

Digital signals are being used more frequently in today's world. We live in a global economy, so we sell and buy things around the world. Digital signals help us communicate with people around the world quickly. Although it transmitting signals digitally can be good, there are many disadvantages to it. The disadvantages are file sizes, processor demands, standardization, bandwidth, and preservation, to name a few.

The first disadvantage deals with file sizes. Disadvantage of file sizes is also an advantage. Every file uses a certain amount of storage or memory. You can send large files digitally. The problem with large files is that they take up large amounts of storage space on your computer's hard drive. This may prevent from sending other files. It is therefore important, as a user, to watch how much storage you have on your hard drive versus how much storage you are using.

The second disadvantage of transmitting files digitally is the strain it puts on the computer's processor. Again, it is great that we can digitally transmit these files, but the computer can be harmed because of it. Large numbers of files that take up a large amount of space can overwhelm the computer. This slows down the computer' functions, which affects the computer's performance.

The third disadvantage of working with digitization is standardization. There is no one model or one set of guidelines, so this can limit digitization. We need a common set of standards that work with all hardware and software interchangeably. This would help us move forward with technology.

Bandwidth is the fourth disadvantage of digitization that I am going to talk about. Bandwidth has to do with the speed of transmitting data in a certain amount of time along a communication channel. When data or information is delivered or received, the transfer can be either fast or slow. A low bandwidth results in a slower rate of transmission, just as high bandwidth results in a high rate of transfer. Obviously, everyone would like the higher bandwidth and this is the problem. Larger files with a great deal of data can take longer to send or be received. This can cause problems in a network.

The last challenge for digitization is preservation. This problem has to do with how long the data or information in the files will last and how long into the future we will be able to access the digital files. This is a concern because of the content of those files. Depending on what the content is, it might be extremely useful, or maybe even critical, to people, to health, or to the security of our nation. Regardless of the content's usefulness or criticalness to life, wouldn't it be a shame to lose information? We therefore believe that preservation is the most important problem to solve in digital technology.

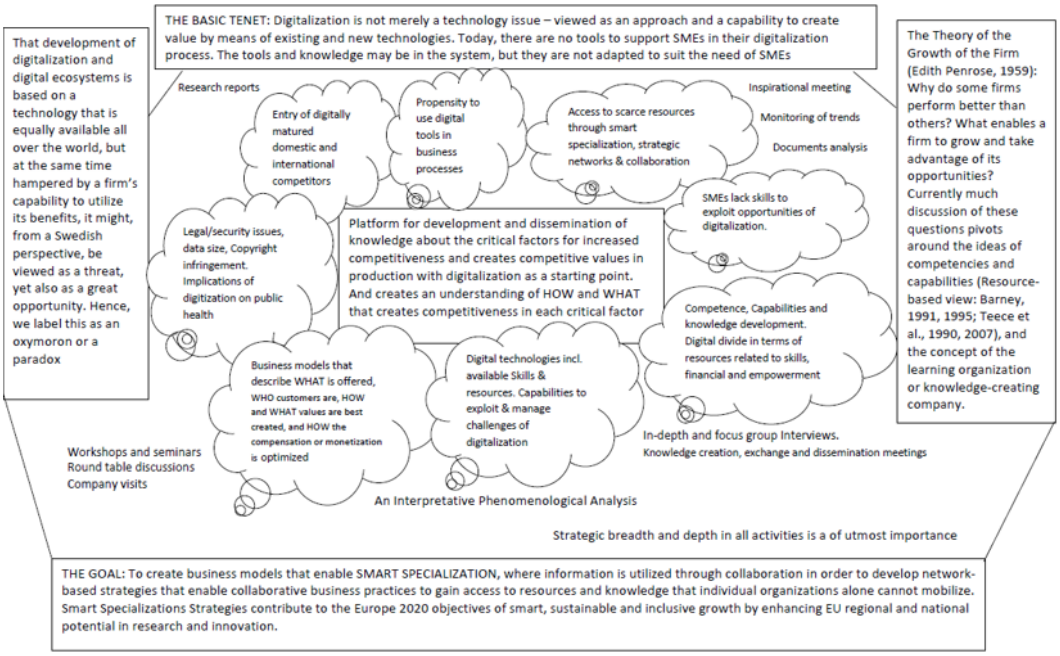
Topography of Prerequisites and Critical Factors of Digitalization

Below is a figure titled "Topography of empirically and theoretically derived prerequisites and critical factors of digitalization" (Figure 1). It aptly depicts the theoretical point of departure and findings from the research project on which this study is based. The "bubbles" within the figure are basically what the respondents considered as the prerequisites and critical factors of digitalization. Their views on how to manage the opportunities and challenges brought about by digitalization in order to foster competitiveness in local, regional, national and international contexts are reported in the rectangular "boxes" around the "bubbles" and on the inner core of Figure 1. Data collection methods are also available in the figure. Knowledge derived from the Figure 1 is used to anchor the discussion of findings and draw conclusions and implications.

DISCUSSION

Why do some firms perform better than others? What enables a firm to grow and take advantage of opportunities brought about by, for example digitalization? Currently much discussion of these questions (Penrose, 1959) pivots around the ideas of competencies and capabilities (Resource-based view: Barney, 1991, 1995; Teece et al., 1990, 2007), and the concept of the learning organization or

Figure 1.



knowledge-creating company (see Figure 1 for more elaboration). Our findings show that the state of a digital divide prevails and that the divide poses a problem and/or opportunity for businesses. There are discrepancies among the respondents with respect to opportunities to benefit from the potential of digitalization, a challenge similarly observed by Markides (2015). The digital divide manifests itself in the form of an *economic divide*, where many SMEs lack the resources to purchase digital equipment; a *usability divide*, where many SMEs lack the skills to use digital technologies even if they were available; and an *empowerment divide*, whereby even if an individual has the digital technologies and knows how to operate them, they are unable to exploit the full potential that the technology could provide.

That development of digitalization and digital ecosystems is based on a technology that is equally available all over the world, but at the same time hampered by a firm's capability to utilize its benefits, it might, from a Swedish perspective, be viewed as a threat, yet also as a great opportunity. Hence, we label this as an oxymoron or a paradox (see Figure 1).

It is also obvious in the project on which findings from this study is based that digitalization, being a part of the societal development, also affects these companies directly as well as indirectly. Digitalization is a key issue for Swedish business and industry. According to the respondents from regional innovation system and SMEs, there are no clear tools to support small and medium-sized enterprises (SMEs) in their digitalization process. With reference to viewpoints from a group of respondents representing the cluster organizations, the tools and knowledge may be in the system, but they are not adapted for SMEs. Large companies can today pay consultants for qualified expertise in digitization. SMEs do not have those resources and then fall behind in the work vis-à-vis the larger players. A clear example of this is e.g. e-commerce in times of crisis (eg pandemic), where SMEs could benefit from using platforms and skills that are currently only available to larger companies (see Figure 1 and North et al, 2019).

Digital revolution has resulted in changes brought about by improved communication technology and digital computing in the latter half of the 20th century (Plesner & Raviola, 2016). Despite the

fact that the digital revolution has significantly modernized the way things are done, the respondents raised concerns about the emergence of the digital world. Businesses can take advantage of the digital divide to increase their market operations and hence profitability (Lloyd, Given & Hellwig, 2000). For instance, firms can stimulate business growth in marginalized areas by outsourcing some services to others, such as to call centres, and outsourcing data processing and other professional services. Such initiatives require an initial investment to train disadvantaged SMEs on how to use digital technology, and once they have acquired the skills (see discussion of the digital divide above, and Preston & Rogers, 2012), they can start to role out their operations on a commercial basis. This will help to an organization to mark its presence and goodwill in these areas for a considerable time to come.

Although the automation of Swedish industry occurred in living memory, extant literature and activities carried out in this study show that the most cataclysmic change since the industrial revolution is currently being experienced in all facets of society (Hagberg et al., 2016; Holmlund et al., 2017; Fremont, Eklinder-Frick, Åge & Osarenkhoe, 2018). How can companies benefit from the new development? It is apparent that digitalization is a part of societal development, and affects SMEs directly and indirectly. Some SMEs want to become digital and are able to discern the potential use of digitalization. However, for SMEs with limited resources, digitalization is associated with uncertainty about the exorbitant costs of digitalization and what it actually entails. This observation is in line with that made by Vives and Svejenova (2011).

In the findings from the current study, the respondents cite relatively isolated technological risks as the basis for their uncertainty surrounding digitalization, such as the risk of a cyber attack interrupting business operations, but in an increasingly interconnected world the consequences can be much greater. (See Figure 1; for similar viewpoints, see Benyayer & Kupp, 2017). Furthermore, technology is also shaping many of our background assumptions and perceptions, and this in turn can shape our understanding of and attitudes towards risks. We live in a world defined by both the accelerating pace of technological change and the uncertainty caused by this rapid rate of change (Benyayer & Kupp, 2017). While SMES are concerned with keeping up with the technological developments that affect them, they remain largely oblivious to many other developments and unsure of how they all fit together.

As evidenced in our findings, technological progress is key to finding lasting solutions to economic, environmental and regional development (Martínez-García, 2013) challenges in an era of the birth of Industry 4.0 and digitalization (Adak, 2015). And the diffusion of digital technologies has enabled a notable transformation in the processes, structures, roles and interactions of firms. This digital revolution affects the organization as a whole, thereby redefining its strategies, entrepreneurial processes, and governance mechanisms or structures (Fremont et al., 2018). This permeation has in turn led to the emergence of new ways of organizing a firm's value chains and inter-firm relationships, which now increasingly occur not in isolation but in so-called digital ecosystems (Kutsikos et al., 2014; Barile et al., 2017).

It is recognized in this study that innovation is born out of interaction (Abrahamson et al., 2017). Innovation often occurs where knowledge and skills from different areas intersect and where organizations learn from each other through interaction (Andersson & Mattsson, 2016). The bottom line is that this research reinforces the vital role of interaction within and between stakeholders in the society (Andresen, 2011; Lundberg, 2008), and how different forms of collaboration can contribute to long-term value creation that strengthens companies' competitive abilities both domestically and internationally. A company can no longer rely solely on its own productive and innovative abilities (Osarenkhoe, Fjellström, Abraha & Awuah, 2020); rather, there is a need to collaborate beyond the confines of the organization so as to better manage the challenges that prevail in today's dynamic environment.

CONCLUDING REMARKS AND IMPLICATIONS

The focus of this study was to investigate how small and medium-sized enterprises (SMEs) perceive the prerequisites and critical factors of digitalization. Against this background, respondents unveiled the positive- and dark sides of digitalization and their views on how to manage the opportunities and challenges brought about by digitalization in order to foster competitiveness. Why do some firms perform better than others and what enables a firm to grow and take advantage of its opportunities are the questions that pivot around the ideas of competencies and capabilities, and the concept of the learning organization or knowledge-creating company. "The Theory of the Growth of the Firm" (Penrose, 1959) addresses these questions and laid the foundation for resource based view of the firm (Barney, 1991, 1995; Conner, 1991; Peteraf, 1993).

In order to ascertain how SMEs perceive the prerequisites and critical factors of digitalization and determine SMEs' digital maturity, we have to be aware that SMEs are part of a heterogeneous universe of extremely diverse economic agents, whose characteristics vary depending on the business sector they operate in, the markets they serve, the products they produce and how involved and connected they are to the macroeconomic context and support institutions (Neirotti et al., 2018). A common denomination for the SMEs included in this study, however, is their willingness to integrate, build and reconfigure internal and external resources to adapt to the cataclysmic changes prevailing in the milieu in which they operate. These dynamic capabilities (Helfat et al, 2006; Teece, Pisano & Shuen, 1997; Helfat & Peteraf, 2003) reside in skills, processes, procedures, organizational structures, decision rules and distinct disciplines that motivate and promote the detection (sensing) and capture (seizing) opportunities in order to reconfigure (transforming) their capabilities (Teece, 2007). This viewpoint is also in line with Penrose (1959) who analyzed managerial activities and decisions, organizational routines, and knowledge creation within the company and argues that they are critical to the ability of a firm to grow. Thus, digital maturity aptly depict that a firm is endowed with appropriate organizational skills and capabilities to succeed in the digital transformation (Berghaus et al. 2017).

At the core of Figure 1 is a platform for development and dissemination of knowledge about the critical factors for increased competitiveness and creates competitive values in production with digitalization as a starting point. And creates an understanding of HOW and WHAT that creates competitiveness in each critical factor. To support SMEs in their work with business models that describe: WHAT is offered, WHO the customers are, WHAT is in demand, WHICH values that are created and HOW this is best achieved, and also HOW remuneration is optimised.

A multifaceted interventions embedded in the specific characteristics of each regional innovative system is needed to reap the benefits and mitigate the challenges associated with digitalization so as to facilitate the vocation of each local context in terms of knowledge, economic, entrepreneurship and social and cultural resources. Consequently, each regional innovation system must develop its own original path that relies on its technological and cognitive base (see Smart Specialization Strategy in Figure 1), as well as underlying resources and skills, to effectively seize the opportunities offered by digital transformation to support business competitiveness, create quality jobs, promote the sustainable development of the territory and redefine the relationships between the public administration and citizens.

This study was conducted with the financial support of European regional development fund (ERDF) and regional partners such as cluster organizations in northern central Sweden, Region Gävleborg and the Swedish Agency for Economic and Regional Growth. Hence, the goal for the next phase of this ERDF project is to create business models that enable smart specialization, where information is utilized through collaboration in order to develop network-based strategies that enable collaborative business practices to gain access to resources and knowledge that individual organizations alone cannot mobilize (see Figure 1). Smart Specialization Strategies (https://s3platform.jrc.ec.europa.eu/) contribute to the Europe 2020 objectives of smart, sustainable and inclusive growth by enhancing EU regional and national potential in research and innovation. Consequently, Smart Specialisation

is an innovation policy concept that aims to boost regional innovation, contributing to growth and prosperity by helping and enabling regions to focus on their strengths. Smart Specialisation is based on partnerships between businesses, public entities and knowledge institutions.

Limitation of the Study

This study was, in part, conducted as an Interpretative Phenomenological Analysis (IPA) study of various Swedish SMEs including actors in the innovation system of Gävleborg county, which may limit the external validity of its results. The study is restricted to a particular geographical location (i.e. Gävleborg county in Sweden). Further research is needed in other geographical settings. As far digital maturity level of SMEs is concerned, their capability to exploit the benefits of digitalization and manage its challenges varies on a national and sectoral basis. Hence, the generalizability of the usefulness of our findings questionable not until findings from different geographical contexts are published. Moreover, in this study, digital divide manifests itself in the form of economic, usability and empowerment. It might be worthwhile to include other capabilities (Teece, 2007; Luo, 2000; Ahmed, 2007;Liu & Hsu, 2011) that could be relevant for fostering digitally enabled growth. This will require more in-depth studies regarding digitalization path and required capabilities (North et al., 2019). Thus, it will be of utmost importance for future studies to investigate the interrelations and the relative importance of the capabilities using a combination of qualitative and quantitative research methods.

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