Survival in the Digital Era: A Digital Competence-based Multi-case Study in the Canadian SME Clothing Industry

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ABSTRACT

Although the literature emphasizes the link between digital competence (DC) and IT adoption, there is a lack of understanding of how DC can be conceptualized in an SME context. Drawing on the literatures on SMEs and DC and on the change agentry perspective, this multi-case study proposes a multi-dimensional conceptualization of DC and empirically tests a typology of three DC archetypes of SME employees: Technical Expert, Organizer, and Campaigner. The results from a multi-case study of three Canadian SMEs suggest that the development of DC should focus on the complementarity nature of the technological, social and cognitive dimensions of the DC.

INTRODUCTION

To compete in global markets, small and medium-sized enterprises (SMEs) need to develop new business strategies and processes involving the utilization of information technologies (IT) (Bharadwaj and Soni, 2007; Nguyen et al., 2015; Kim et al., 2016). It has been shown that the ability of SME businesses to innovate relies on investments made in IT infrastructures, the success of which, in turn, depends on employees having expertise and the appropriate competences to maximize the IT use (Kotey and Folker, 2007; Peltier et al., 2012). The literature suggests that SMEs, in general, have reduced human and financial resources and are therefore likely to be less ready to adopt new IT and change their business strategies (Cragg et al., 2013; Morgan-Thomas, 2015). A review of extant literature reveals that, for SMEs to benefits from IT, SME employees' needs to better understand the challenges confronting SMEs that hinder the adoption and use of IT. Thus, SME employees need to have the appropriate digital competence (DC) (Caldeira and Ward, 2002; Ferrari, 2012). The ability to align business strategies with existing IT skills was found to have a significant impact on the level of IT adoption and use in a SME (Fillis and Wagner 2005; Bharadwaj and Soni, 2007). On one hand, SMEs need to adopt IT strategies to keep up with the digital economy. On the other hand, they lack employees with appropriate DC. But, how do SMEs' managers assess what DC their employees have or need to have? The lack of a precise understanding of

what DC is represents a significant challenge in determining if SMEs are capable to compete in the digital economy (Ashurst et al., 2012).

Competence in general is a widely-used concept, which represents different things to different people. The Oxford English Dictionary (Oxford Dictionaries, 2017) defines it as "the ability to do something successfully or efficiently". This is a broad definition, which may explain why competence has been conceptualized as an umbrella-type of notion wrapping almost every attribute that might influence performance (Bassellier et al., 2001). In the context of a 21st century digitized society, DC is an essential life asset (Ala-Mutka, 2011) which represents a "set of knowledge, skills, attitudes, abilities, strategies, and awareness that are required when using IT and digital media to perform tasks; solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, and socialising" (Ferrari 2012, p.43). This long and detailed definition suggests that DC covers more than the plain know-how and technical skills usually associated with IT competence in an organizational context and accentuates the idea that DC must also take into consideration contextual/social aspects and be complemented by cognitive and socio-emotional knowledge, skills and attitude (Ala-Mutka, 2011).

The information systems (IS) literature on SMEs provides evidence that different levels of IT competence in the organizations studied are related to different levels of accumulated individual IT skills and knowledge in the organization. In particular, the development of internal IT skills combined with management's knowledge and attitudes towards IT adoption and use create the competences required to achieve higher levels of success with IT use in SMEs (Dibrell et al., 2008). In the last two decades, much of the research in IS had adopted a more technical perspective of IT/DC competence (Marcolin et al., 2000) and has focused on identifying: 1) business managers technical skills (Bassellier et al., 2001); 2) IT specialists knowledge and skill (Seppanen, 2002); or 3) IT professionals' personality characteristics (Bashein and Markus, 1997). One thing that should be highlighted, is that most past IS studies on individual DC had a relatively narrow and specific conceptualization of user. This approach is not wrong, however, in the 21st century, this perspective is too limited and tends to put more emphasis on technological aspects of IT use and limiting attention to other aspects, such as social environment sensibility and cognitive capabilities related to the effective adoption and use of IT (Burton-Jones and Grange, 2013).

All these definitions of IT/DC have one commonality: they all portray IT/DC as a multidimensional. Some conceptualizations tend to emphasize the practical and technical aspects of using IT (Marcolin et al., 2000), while others suggest that developing DC necessitates a focus on the acquisition of higher order thinking skills (Ferrari, 2012) in various areas (Calvani et al., 2008). Information technologies are more and more ubiquitous and the use of such technology is now spread across the different types of jobs, organizations' levels and to accomplish a multitude of various tasks. However, as suggested by Lamb and Kling (2003) researchers should not only consider IT users (i.e. "the active agent in information system use") as such, but more as social actors who are "simultaneously enabled and constrained by the socio-technical affiliations and environments of the firm, its members, and its industry" (Lamb and Kling,

2003, p.218). Thus, since SME employees are social actors who have to play many different roles (Lamb and Kling, 2003), the responsibility of "technology forecasting" as well as introducing and using new IT is often shared by all the employees of a SME (Bruque and Moyano, 2007). In such a situation, each SME employee has to become an agent of organizational change (Markus and Benjamin, 1996). Jones-Evans (1996) has shown how important specific SME employees are "in influencing the success of the small technology-based venture which they initiated (p.15)" and how these employees eventually influence IT adoption and use.

In sum, extant literature on DC provides a myriad of different conceptualizations of DC and reveals a scattered image that falls short of providing the clarity needed by scholars and managers alike to understand the multidimensional nature of this concept. Also, the literature on SMEs falls short of specifying what type of DC SME employees needs to have and has yet to offer a unified view on DC role is in the process of gaining value from IT-based business. Considering this gap in the literature, this study aims to propose a more encompassing conceptualization of DC. More specifically, we address the following research questions:

How can digital competence be conceptualized? Do different types of digital competence exist in SME? If so, how can they be characterized?

We draw on the existing body of research on SMEs and various DC definitions and on the change agentry perspective to propose a DC typology in the SME context. To do this, three key *competence areas,* i.e., technological, cognitive and social along with their *learning domains*, i.e. skill (know-how), knowledge (know-what) and attitude (know-why) are assembled in a theoretical framework. We then theorize about how different combinations of competence areas and learning domains are related to IT adoption and use in the SME context to propose a typology of SME employees' DC archetypes. These archetypes are empirically tested in three different case studies of Canadian SMEs.

Our study provides "an explanation of how, why, and when things happened, relying on varying views of causality and methods for argumentation" (Gregor, 2006, p.619) and proposes a theoretical tool that enables readers to develop a broad understanding of a typology of DC in the SME context. As we pursue a theory-building avenue, we put "less emphasis on the synthesis of prior literature and more emphasis on theoretical development" (Rivard, 2014, p. iv).

THEORETICAL FOUNDATIONS

Digital Competence Conceptualization

Digital competence is just one of other organizational competences that involve differential skills, complementary assets, and routines used to create sustainable competitive advantage in line with customer value (Selznick, 1957). In this vein, organizational digital competence can be defined as the level of technical expertise available to the organization. Rather than at the organizational or group levels, digital competence is most analyzed at the individual level, as most organizational competences start with the individual (Pavlou and El Sawy, 2006).

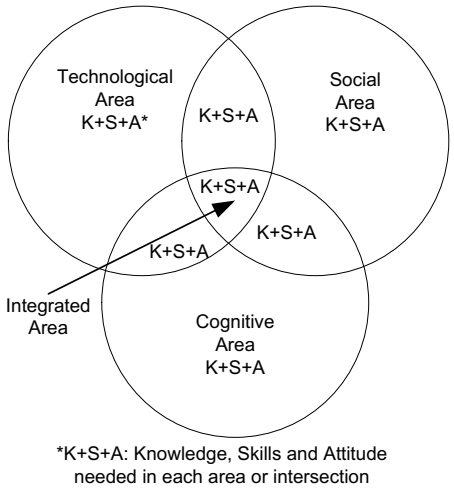
In an organizational context, a competence is either an organizational attribute, which encompasses individual skills and collective knowledge of the members of the organization, or an individual attribute. The IS literature suggests the more knowledge an organization has about technological innovations, the more likely it will be to adopt and use technological innovations. While at the organizational level the extant literature presents several studies in which researchers advance a variety of IT management competencies (e.g. Pavlou and El Sawy, 2006), at the individual level (e.g.; Bassellier et al., 2001; Bassellier and Benbasat, 2004), the researchers focused on specific IT competences of managers and IS professionals. For instance, at the organizational level, IT competence represents "the extent to which a firm is knowledgeable about and effectively utilizes IT tools to manage information with the firm" (Pavlou and El Sawy, 2006, p.204). At the individual level, such general and encompassing definition and operationalization does not exist. Thus, the extant literature proposes a multitude of variants of DC applied in different contexts. However, this generates confusion when one tries to compare and integrate research findings, to explain in a unified definition what individual DC exactly is and how one should integrate and compare its imbricated dimensions.

It has been suggested that knowledge, skills and attitudes are the three learning domains underlying DC (e.g. Bassellier et al., 2001; Harison and Boonstra, 2009). At the conceptual level, since competences are sensitive to the organizational context (Harison and Boonstra, 2009; Cragg et al., 2011), a conceptual definition of DC should identify the main competence areas and the main learning areas associated with the specificities of a particular context. In our view, it would not be reasonable to think of a unique set of DC, always relevant, applicable and in all organizational contexts that are usually characterized by idiosyncratic practices, norms, and values. Thus, at the conceptual level, DC should remain stable while at the operationalized level, regular adaptations and revisions should be carried to align with specific settings and follow the changes in technical environment and social practices (Doty and Glick, 1994). Thus, we consider DC as a multidimensional concept illustrated by a set of knowledge, skills and attitudes needed to be functional in an organizational digital environment. Its acquisition and possession in an organizational context may enable individuals to adapt to new practices and norms requirements set by the evolving IT (Bassellier et al., 2001; Bassellier and Benbasat, 2004). These practices entail contextual knowledge and certain beliefs and values about IT. In other words, IT needs to be appropriated by social actors that engage in the role of change agent (Burton-Jones and Grange, 2013). Based on the above argumentation, we propose the following conceptualization of individual DC:

> *Digital competence is an individual capacity to use and combine one's knowledge (i.e., know-what), skill (i.e. know-how), and attitude (i.e. know-why) associated with three related competence areas, i.e. technological, cognitive and social, to use new or existing IT to analyze, select and critically evaluate information in order to investigate and solve work-related problems and develop a collaborative knowledge base while engaging in organizational practices within a specific organizational context.*

The multi-dimension conceptualization of the DC is illustrated in Figure 1. The proposed conceptualization of DC entails a critical understanding of three complementary and co-existing areas of application or *competence areas*, i.e. technological, cognitive and social. The **technological area** is underpinned by the knowledge, skills and attitude needed to explore new technological contexts and face technological problem in a flexible way (Calvani et al., 2008; Ferrari, 2012) such as solving problems when the IT used does not work, selecting the most suitable IT solution and recognising and using icons and interfaces of particular IT (Ferrari, 2012). Thus, example of technological knowledge could include knowledge about hardware, software applications, etc. (International ICT Literacy Panel, 2007). IT skills could include, for example, the ability to use specialized tools supporting business tasks or to execute the technical operation aspects of digital tools (Ala-Mutka, 2011).

Figure 1. Individual Digital Competence: A Multi-area Conceptualization



The **cognitive area** is underpinned by the knowledge, skills and attitude needed to "read, select, interpret and evaluate data and information taking into account their pertinence and reliability" (Calvani et al., 2008, p.187). The cognitive area is related with access to, organization of and evaluation of information. It includes "tasks on linguistic and numeric competences applied to the digital word" (Ferrari, 2012, p.56), dealing with text, organizing data, evaluating information, selecting and interpreting graphs (Calvani et al., 2008). Example of cognitive skills include "general literacy, […] as well as critical thinking and problem solving" (International ICT Literacy Panel, 2007, p.1). The **social area** is underpinned by the knowledge, skills and attitude needed to interact with other individuals collaboratively using available IT along the line of the existing organizational work norms and values (Calvani et al., 2008). Thus, examples of social skills include "effectively express and communicate, understanding the potential and limitations of each type of media […] collaboration with possibly global reach, construct and maintain a system of personal communication links with relevant people and networks, […] participate in digital activities", etc. (Ala-Mutka, 2011, p.51).

The **integrated area** represents the overlapping zone of the three main areas and is underpinned by the knowledge, skills, and attitude needed to adopt and use IT in

organizational practices and collaboratively build new knowledge bases. This means that the integration between the three areas encompasses the competences needed for collaborative work and requires that individuals understand "the potential offered by technologies which enable individuals to share information and collaboratively build new knowledge" (Ferrari, 2012, p.55).

An Integrative View of Digital Competence

Various definitions of the three learning domains (i.e. knowledge, skills and attitude) have been proposed in different literatures, e.g. IS, SME, organization behavior, organization learning, etc. However, such diversity of definitions has created some confusion about what exactly each of these concepts means. Thus, since these concepts are central to the proposed DC conceptualization and that our objective is not to redefine these concepts, we use and adapt general definitions presented in previous studies to the context of DC (Table 1).

Table 1. Digital Competence: Learning Domains Definitions

Domains	Definition	Source
Knowledge	Facts, information, principles, theories and practices acquired through experience and/or education, i.e. the theoretical or practical understanding of the nature, role and opportunities of IT in everyday contexts such as, for example, using computer applications, understanding of the opportunities and potential risks of Internet and social media, information sharing and collaborative networking, etc.	(Ala-Mutka, 2011; Bassellier et al., 2001; Oxford Dictionaries, 2017)
Skills	The ability to apply knowledge to complete tasks; to solve problems; to search, collect and process complex information and; to produce, present and understand it, using IT, in a critical and systematic way.	(Ala-Mutka, 2011; Marcolin et al., 2000; Oxford Dictionaries, 2017)
Attitude	The ways of thinking and the motivations for acting that shape people's action in digital environments such as intercultural, collaborative, critical, creative, responsible and autonomous aspects. For example, they include ethics, values, and priorities.	(Ala-Mutka, 2011; Ferrari, 2012)

Ferrari (2012) argues that DC covers much more than technical skills and depict seven competence domains of application (see Table 2) that individual should master in order to adapted to the current needs of modern organizations. Table 2 also shows how the seven key competence domains of application are captured by the proposed DC conceptualization (combination of three competence areas and three learning domains).

Table 2. An integrative View of Digital Competence (adapted from Ferrari, 2012; Harison and Boonstra, 2009)

Domains of application	Digital competence areas (Figure 1)	Description
1. Information Management	Intersection of Technological and Cognitive areas	Identify, locate, access, retrieve, store and organize information.
2. Collaboration	Social area	Link to others, participate in online networks and communities, and interact constructively and with a sense of responsibility.
3. Communication and sharing	Intersection of Technological and Social areas	Communicate through online tools, considering privacy, safety and netiquette.
4. Creation of content and knowledge	Cognitive area	Construction of new knowledge through technology and media. Integrate previous knowledge; construct new knowledge.
5. Ethics and responsibility	Intersection of Social and Cognitive areas	Behave in an ethical and responsible way, aware of legal frame.
6. Evaluation and problem solving	Integrated - Technological, Cognitive and Social areas	Identify digital needs, solve problems through digital means, and assess the information retrieved.
7. Technical Operations	Technological area	Use technology and media, perform tasks through digital tools.

A Typology of Digital Competence in the SME Context

The three learning domains and the three competence areas in our DC conceptualization are complementary and can be combined in various ways. Each specific combination can describe a particular archetype of DC (Doty and Glick, 1994). By taking into consideration the social area and its relation with the technological and the cognitive areas, the DC conceptualization takes a change agentry perspective (Lamb and Kling, 2003; Markus and Benjamin, 1996), which is more encompassing than the narrower perspective of user taken in previous studies (e.g. Marcolin et al., 2000). Thus, we use Figure 1 to develop a typology of SME employees DC archetypes (Doty and Glick, 1994; George and Bennett, 2005). In order to describe a complex organizational phenomenon such as DC profiles or archetypes, and its influence on IT adoption and use, several researchers have advocated the development of typologies and typological theories (George and Bennett, 2005). Typological theories address complex phenomena without oversimplifying them, take into account holistic principles of inquiry and equifinality (i.e., the same outcome being attained via different pathways) and identify the pathways connecting particular archetypes to specific outcomes, such as IT adoption and use (George and Bennett, 2005). A typology identifies multiple ideal types or archetypes which are "[…] complex constructs that can be used to represent holistic configurations of multiple unidimensional constructs" (Doty and Glick, 1994, p.233) and these archetypes are posited to be maximally effective.

A major challenge underlying the development of a typological theory of DC in SME is to theoretically identify different DC profiles that are possible, i.e. a typology of DC archetypes. Thus, since SME employees can be considered as change agent, we drew upon past research on the change agentry perspective as a theoretical foundation to do

so (Markus and Benjamin, 1996). According to Hirschhorn (2002), organizations that want to stay alive must constantly change to adapt to their moving environment. He suggested that, to be successful, change agents need to systematically employ three distinct, but related change approaches: the *political campaign*, to create a strong coalition and to get support; the *marketing campaign*, to communicate key messages, such as the benefits and themes, and to get into the thoughts and feelings of employees; and the *military campaign*, to organize and deploy scarce resources. In this vein, Markus and Benjamin (1996) propose three models of change agentry: *traditional, facilitator and advocate*.

Each of these models characterizes the dominant beliefs underlying a change agent's behaviors and provides "a basic orientation toward goals and means of IS work that shapes what the practitioner does and how she or he does it" (Markus and Benjamin, 1996, p.387). Thus, the three models reflect archetypes (not empirical categories) and can be used to characterize the underlying DC associated with each model in relation to IT adoption and/or use in SME (Harison and Boonstra, 2009; Markus and Benjamin, 1996). Similarly, Hirschheim and Klein (1989) identified four dominant patterns of core assumptions, or archetypes, to characterize IS specialists' assumptions and influence their behaviors: *expert*, *facilitator*, *social warrior* and *emancipator*. Parallels between the *facilitator models* of Markus and Benjamin (1996) and Hirschheim and Klein (1989), as well as the *political* and *marketing campaigns* of Hirschhorn (2002) can also be identified. Overlaps also exist between the *advocate* (Markus and Benjamin, 1996), the *social warrior* (Hirschheim and Klein, 1989) and the *military campaign* (Hirschhorn, 2002).

Table 3 summarizes the characteristics of the three proposed DC archetypes: *Technical Expert*, *Organizer*, and *Campaigner*. Based on this description and using the DC conceptualization, it could be possible to hypothesize that the knowledge, skills and attitudes of a "technical expert" change agent would predominantly be related to the technological area rather than the social or cognitive area. It does not mean that the DC of the "technical expert" change agent would have no knowledge, skill and attitude related to the social and cognitive area. It would rather mean that it is the technological area that would "dominate" over the other. The same logic can be applied to the "organizer" and the "campaigner" types of change agent. The above review suggests that only a few distinct conceptualizations of change agent exist, and they have significant similarities.

While these conceptualizations of change agent provide interesting visions of digital competence archetypes, they are somewhat general and simplistic, as the overlapping characteristics they identify do not provide a broad conceptual perspective of the DC underlying each change agent type. Furthermore, even if these change agent models could probably be used to characterize the DC of SME employees, they have not been specifically developed for the context of SME.

Moreover, they are not sufficiently granular to use the proposed DC conceptualization (see Figure 1) to characterize the knowledge, skills and attitude of each change agent conceptualization. While conceptualizing DC archetypes theoretically is intuitively appealing, their inherent lack of specificity also makes them difficult to be empirically tested. The present study is an initial attempt in that direction, and to do so, the DC

conceptualization (Figure 1) is used as a "property space" to empirically identify existing DC archetypes of SME employees (George and Bennett, 2005).

Table 3. Change Agentry-based Digital Competence Archetypes in PME Context

	Overarching Labels of Different Archetype Conceptualizations		
DC Archetype	**Technical Expert**	**Organizer**	**Campaigner**
Parallel conceptualization	• Traditional model (Markus and Benjamin, 1996) • Expert type (Hirschheim and Klein, 1989)	• Facilitator model (Markus and Benjamin, 1996) • Facilitator archetype (Hirschheim and Klein, 1989) • Political/marketing campaigns (Hirschhorn, 2002)	• Advocate model (Markus and Benjamin, 1996) • Social warrior archetype (Hirschheim and Klein, 1989) • Military campaign (Hirschhorn, 2002)
Overlapping key characteristics	1. Focuses on technical expertise; 2. Detached from stakeholders' objectives; 3. Responsible for technical aspects only; 4. Works with minimal contact from stakeholders.	1. Focuses on stakeholders' support; 2. Serves stakeholders' objectives; 3. Helps stakeholders increase their capacity for change and autonomy; 4. Provides learning advice; 5. Is responsible of changing the stakeholder's behaviors; 6. Instructs stakeholders in making informed decisions; 7. Tries to gain consensus; 8. Is organized and flexible.	1. Uses tactics (e.g. persuasion, manipulations, power) to attain his objective; 2. Responsible for attaining change objectives; 3. Makes decisions to guide the change effort in a particular direction; 4. Focuses on objectives. 5. Is well organized, and focuses on objectives.

METHODOLOGY

Our study adopts a qualitative research methodology (Eisenhardt, 1989). This approach helps our objective to understand SMEs stakeholders' perception of the role of DCs and the importance of implementing new IT in the context of a digital economy. A qualitative exploratory research enables us to make new theoretical and empirical contributions in the extant fragmented literature on digital competence and is justified by a lack of studies on DC in the context of SMEs. We saw the opportunity to try to better understand the organizational, individual and structural characteristics that can have an impact on the development of the DC in SMEs. Therefore, we use a multi-case method (Yin, 2013) that allows us to highlight contrasting or similar situations in the process of development of the digital competence.

Empirically identifying DC archetypes based upon perceptions of experienced SME employees provides a viable approach. Since we are in the exploratory phase of theory development where "how" research questions are being asked, a field study using case studies represents an appropriate strategy because it helps in defining the appropriate research design and data collection method but also serves as the main vehicle for generalizing the results of the case study (Yin, 2013).

To collect data, a multi-case study of three SMEs (*Palazzo*, *Knitware* and *Nylonia* – not their real name) from the Canadian clothing industry has been carried out between May and September 2015. In each case study, five to nine individuals have been interviewed (before and after the IT training and adoption of IT) including: the SME

owners, the HR and IT managers, as well as other representative employees. For each of our three cases, the two researchers have conducted semi-structured interviews based on a set of questions aimed to : understand the IT evolution in the enterprise, the role of IT in the achievement of the daily tasks; identify individual DC; discover pertinent information related to the development of DC, the IT infrastructure characteristics and the organizational context; assess the willingness to implement and use IT in the enterprise, the level of collaboration between the employees and their confidence in the IT-triggered change. The questions were based on the key elements of the DC conceptualization (Figure 1 and Table 2) as well as on questions developed by other researchers (Cragg et al., 2011; Harison and Boonstra, 2009).

The data analysis goal was to assess the usefulness and relevance of the DC conceptualization, investigate the existence of and the dimensions of DC archetypes of SME employees, and identify their relationship with IT adoption and use. Because of the exploratory nature of the research and the complexity of the investigated phenomenon, the analysis focused on the dynamics within cases and across cases in order to build an DC typology from case studies (Eisenhardt, 1989; Yin, 2013). As such, this theory building process is particularly relevant for studies where a priori constructs are triangulated by multiple case studies and where within-case and cross-case analyses are combined with the literature (Eisenhardt, 1989). Data collection and data analysis had overlap in order to make adjustment during the data collection (Yin, 2013).

FINDINGS

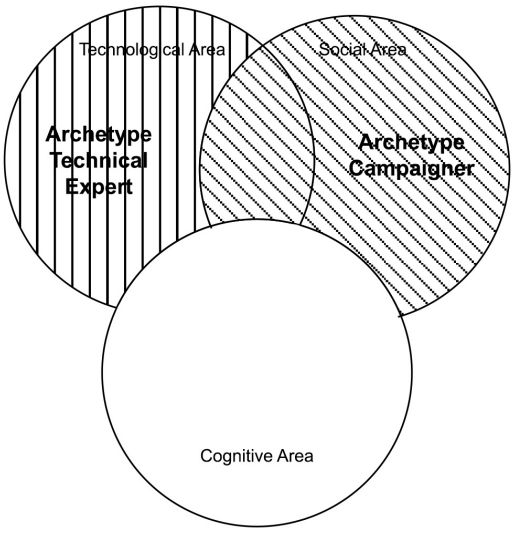
Case 1: Palazzo

Palazzo is a 350 employees company specialized in the manufacturing and retail clothing and competes in an industry segment characterized by continuous change and strong competition from Asian counterparts. In the past six months, the company has implemented a new integrated IT platform (Lectra) for their automated sewing machines. To ensure a smooth transition from the legacy technology to the new one, the company needs to understand what type of digital competence its employees need to possess. We interviewed six Palazzo employees (three managers: production, IT, and HR, and three sewing workers – pattern technicians). Interview data analysis points to the existence of digital competences based on two of the four DC areas: social and technological areas (Figure 2).

The interview data suggest the DC archetype *Campaigner* is strongly embodied by the production manager. She develops and engages her technological and social relational skills to introduce the new IT that would support Palazzo's continuous development strategy to increase the competitiveness of the company.

> *"Provide the proper working tools. Evaluate the needs. Identify who can address the needs. Send him/her to training. Some already had the training: you just have to find the right job position for them. Find the right time to move the employee to a new job position or get him/her to change his work practices." (Production manager)*

Figure 2. Palazzo: Campaigner and technical expert archetypes



Our analysis indicates that the DC archetype that characterizes the three pattern technicians is the *Technical expert*. They focus on the technical expertise and work in collaboration with their colleagues. However, this collaboration is rather limited to exchanging information on how to use the system:

> *"Once a new technology has been introduced, we get training. And then, after most of the people get trained, the ones that are more competent will be able to train some other employees […] As soon as we discover something we will share it. We would say: 'oh look, I found a new function; it works like that, what you think about it?' Then, we will share it among us." (Pattern technician)*

The data analysis suggests a relationship between the archetypes *Campaigner* (Production manager), characterized by strong social and some technical knowledge, skills and attitudes, and *Technical expert* (Pattern technicians), illustrated by learning domains exclusively related to the technological area of the digital competence. While the development of DC at Palazzo apparently was based only on a mix of technological competence (IT use as a working tool and for problem solving) and a strong social competence (relational skills to nurture organizational goals that respect internal norms and quality standards), we conjecture that the inclusion of the cognitive[1] DC area is a key factor for a successful adoption of the new IT.

Case 2: Knitware

Knitware is a family-owned company operating in the field of clothing wholesale distribution, specifically in the business of knitting and employs 40 people. The fabrics come from Italy and Egypt, while the products are designed in Canada and produced in

[1] Capturing and evaluating the cognitive knowledge, skills and attitudes of each respondent via semi-structured interviews have been challenging. A more appropriate approach would have been to use an evaluation questionnaire. While we have been able to collect data related to the cognitive area in each of the three case studies, we have not been able to evaluate this area and thus, we left it blank in Figures 2, 3 and 4.

the company owned workshops in China for over 30 years. In August 2014, Knitware launched their online store to reach a new market. However just prior to this, the company had to implement a customer relationship management system linked with the existing point-of-sale (POS) system. We interviewed nine Knitware employees. Data analysis points to the existence of digital competences based on all the three competence areas (Figure 3).

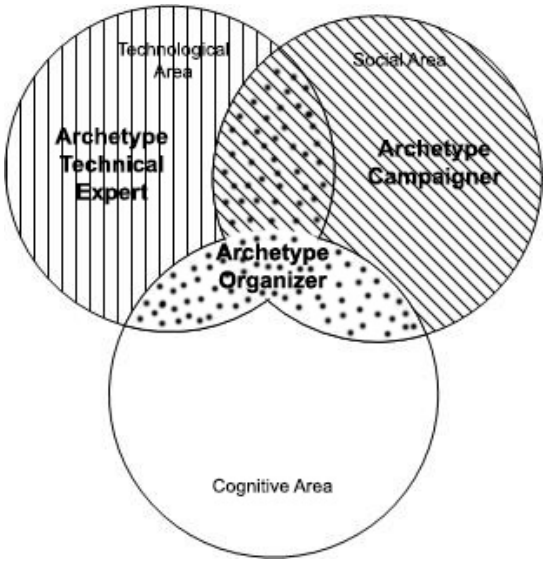
The interview data suggest that the *Technical expert*, the *Campaigner* and the *Organizer* are present at Knitware. The warehouse clerk who has interest in all technologies and has a good understanding all Knitware's business processes illustrates the *Technical Expert* archetype. He self-learned the technology and, with its understanding of the company, he made useful improvements in the systems. He became the de-facto IT 'expert'.

> *"I was very much accustomed with the warehouse and the POS. I became the key resource for these systems because I understood how to do reports and the inventory. I was able to master all the functionalities of those systems" (Warehouse clerk)*

At Knitware, different individuals embodied the *Campaigner* archetype. Each of these individuals are in charge or responsible of various sectors of the company, e.g. design, distribution, production, boutiques, accounting. Thus, each of them is promoting its own preoccupations and interests regarding the new upcoming system.

> *"Family is family, so sometimes individuals are squabbling like any family, but it gives us even more the feeling of being part of the family. However, it allows clarifying things and helps having a better understanding of the organization. Honestly, everyone means great and like I said, we're really involved." (General Manager)*

Figure 3. Knitware: Organizer, Campaigner and Technical Expert Archetypes



Finally, the *Organizer* archetype role was 'played' by the owner's daughter who had worked in the company for the past 10 years, who knows very well the products and organizational processes and who was appointed, by his father (the owner), as the

responsible for all the IT projects. She did not have any specific technical competences before taking on this role but she read and learned about various IT affordances. She also assisted to professional IT conferences and surrounded herself with specialists. She became the 'hub' of the company in terms of IT. She plays an orchestrating role between individuals.

> *"She is the one most interested with IT [...] she began to understand, to seek, to always push for us to be on the cutting edge of technology, [...] She surrounded herself with a team of young people comfortable with IT." (Staff coordinator)*

The data analysis points to a central role of the *Organizer* archetype characterized by social knowledge, skills and attitudes, but also by technological interest and understanding of the IT affordances. The Organizer was the convergence point of Knitware in terms of IT. The data also suggest the existence of a complementarity of the competences of each individual. This may explain why Knitware is doing so well in terms of IT adoption and use. The company manages to capitalize on this complementarity by using several 'bonding' mechanisms (e.g. regular meetings, internal use of social media – Yammer[2] –, roles exchange, etc.) but also by having a resource (the *Organizer*) in charge of knowing everyone's DC competence in the organization and orchestrating the proper deployment and use of theses competences.

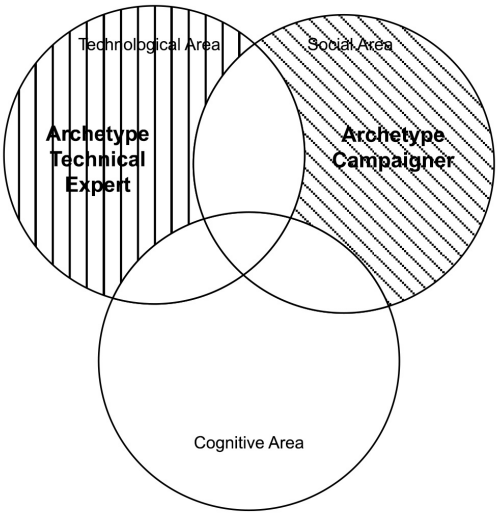
Case 3: Nylonia

Nylonia is a family-owned business in the hosiery and sock mills sector and employs 100 people. It is specialized in high performance tights and competition apparel (e.g., dance and figure skating clothing). We interviewed five employees. The product diversification led the enterprise to develop new competences to foster a higher flexibility in the production tasks. The adopted technical product innovation and the implementation of an information system responding to the internal needs notwithstanding, the enterprise had invested less in IT in the last few years and the development of digital competencies seems to come from external needs. Our data analysis shows that at Nylonia the production/HR manager is the main resource to understand the importance of the digital competence and the general manager seems to approve IT solutions based on ease of use and high performance.

Data analysis suggests the existence of digital competence based on only two competence areas (Figure 4) and shows that the *Campaigner* archetype is strongly embodied by the general manager. However, compared to Cases 1 and 2, here the *Campaigner* lacks the basic technical skills to understand the actual IT status in the company. In this organization, the president/owner is in his 50s, and he delegates most the managerial responsibility to the general manager who uses his hierarchical position, his seniority and his social relational skills to promote and justify the need for a web-based e-commerce solution. However, he does not seem to understand the technical challenges to integrate a transactional web-based system within a technological legacy-based environment (old mainframe AS400 developed in the 70s-80s).

[2] Yammer is a freemium enterprise social networking service used for private communication within organizations (Wikipedia)

Figure 4. Nylonia: Campaigner and Technical Expert Archetypes



"He knows the organization well and he is well-intentioned. However, he does not seem to understand that the technological heart of the company, the AS400, is old and not flexible" (Sales/customer service manager).

Our analysis indicates that the two managers reporting to the general manager (the production/HR and the sales/customer service) are the illustration of *Technical expert*. They know very well the people, the tasks and the technology related to the organizational areas under their responsibility. However, they lack the understanding of the rest of the organization as well as the general manager's intentions regarding IT projects. They have not been informed or consulted regarding those projects. The communication between departments and hierarchical levels is deficient and the general manager mostly relies on the development of the versatility of its employees, which is not linked to the development of a digital competence.

"My team is open and ready. We want new technologies to be more efficient and up-to-date, but we have no idea what's coming and where we are heading" (Customer service manager).

DISCUSSION AND CONCLUSIONS

The literature suggests that SMEs create value through IT innovation, which represents the firms' ability to be resourceful and capture the value-creating opportunities presented by the growth of IT and its usage (Peltier et al., 2012; Kim et al., 2016). In the context of SMEs, the organizations that have employees with the appropriate DC are more likely to accept innovations as they have a better understanding of the benefits of such innovations than if such competences were lacking (Caldeira and Ward, 2002). Our data analysis yielded four main takeaways:

Training approach and digital competence development. Apart from Palazzo, the other two SMEs lacked a HR formal training structure to foster the development of the

individual digital competence on a regular basis. When a training session was offered, it usually concerned only the employees that already have some technical skills. The knowledge sharing and vicarious learning were not encouraged. Therefore, the cognitive and social dimensions were largely ignored during the development of the digital competence.

Digital competence diffusion*.* The relationship between the employees with digital competence and the rest of the SME employees lacked formalized rules in dealing with collaborative tensions. With the exception of Knitware, the other two SMEs did not have mechanisms in place to encourage collaboration or knowledge transfer. Most of the acquired knowledge during trainings was not documented and there was a lack of interest in creating an organizational memory that would support the documentation of the digital competence creation and maintenance in the context of a small business.

Management of cognitive and social competences*.* The managers of the three SMEs rarely encouraged the appropriation of the information associated with software and hardware use by elaborating operational manuals. We conjecture that this aspect might have been an obstacle to the reinforcement of technological, cognitive and social innovation levels in the three SMEs. Our analysis suggests that, except for Knitware, the other two SMEs did not recognize the importance of nurturing individual cognitive competences and collaboration initiatives (social competences) which usually constitute success factors in the process of creating innovative ideas.

The social dimension of the digital competence*.* We found that the collaborative dimension (social) of the digital competence was not enough emphasized by the three SMEs. Data analysis suggests that the collective digital competence was situated at a low level for at least three reasons: a. the silo approach in managing the departments – which prevented the knowledge sharing among employees; b. the sole ownership of the digital competence by the manager in charge of the IT-driven change; c. the lack of communication skills by the change manager that prevented him/her to disseminate his/her vision of how to develop a digital competence to the other SME stakeholders.

The main conclusion of our study is that differences between the three SMEs regarding IT business value emerge from their respective capacity to develop and exploit their IT resources (different types of technologies and individual digital competences) and non-IT competences in a complementary fashion. Non-IT competences are defined as those that allow an organization to perform key activities exceptionally well without using IT (e.g. indigenous innovative skills, personal experiences, connections, commitment, openness of communication, and collaboration) (reference). Non-IT competences may also refer to “complementary assets” (Davern and Kauffman, 2000) that enable the transformation of the firm’s IT investment into value. These competences emerge in companies that have appropriate human resources (HR) capabilities (Aral et al., 2012). A company with good HR practices can recruit, develop, motivate, and empower appropriate candidates. This approach enables the process of building strong digital competences (Makadok, 2001).

While DC is regarded as a core competence, it is not yet a standardized concept in the IT literature in general and on SMEs in particular. The need for a conceptual model to assess DC in a SME environment is based on recent studies which suggest that: small businesses need to adopt IT strategies to keep up with the new economy; and successful innovation in this organizational context depends heavily on investments made in IT platforms, the success of which, in turn, depends on employees having the appropriate IT skills (Cragg et al., 2013; Kim et al., 2016).

By addressing the lack of a clear understanding of what digital competence is, the main contribution of this article constitutes the proposal of a DC definition based on a conceptual framework. This study suggests that DC represents a set *learning domains*, i.e. knowledge, skills and attitudes (including abilities, strategies, values and awareness), related to three *competence areas*, i.e. technological, social and cognitive, that are required when using IT in an organizational context to: 1) perform tasks and solve problems; 2) communicate, assess and manage digital information; 3) collaborate to create and share knowledge; and 4) build knowledge effectively and efficiently for sustaining successful organizational practices.

Second, we advance a typology of key DC archetypes in the context of SME. Based on findings from three SMEs we identify three DC archetypes: *Campaigner, Organizer and Technical Expert.* These results confirm Harison and Boonstra's (2009) study outcomes by suggesting that development of efficient DC is linked to the existence of organizational competences to successfully manage organizational change.

Third, our study sheds light on how and why multiple combinations of technology-related learning dimensions and social- and cognitive-based competences may emerge in different SMEs. The outcomes of our study suggest the existence of several combinations of learning domains (knowledge, skills and attitudes) and competence areas that result in different typologies of DC. They also show the existence of a wide range of non-IT competences (collaboration, personal experience, commitment, etc.). These configurations based on contextualized HR practices would correspond to different levels of organizational competitive performance, with the possibility that some configurations, though different in their composition, would be comparable in their effects. The possibility of similar outcomes from different competence configurations (equifinality) suggests there would be no "best way" to combine different IT and non-IT competences, and the successful outcome of these combinations would stem from more "aligned" combinations with the specific goals of each company.

As for addressing the needs of practitioners, by testing our conceptual framework in three different SMEs, we observed that it is virtually impossible that a single individual possesses all the required knowledge, skills and attitudes in all the competence domains. More importantly, the results of our analysis suggest that it is not the universality of DC (i.e., a single individual possessing all the required DC dimensions) that is imperative in an SME, but rather the complementarity of its three competence areas. Thus, we posit that, to improve IT adoption and use, SMEs need to have individuals mastering learning domains in one or two of the three DC areas and at least an individual (the *Organizer*) having enough knowledge, skills and attitudes to acquire a three-area complimentary DC that would reflect the needs of the specific organizational context. This combination will eventually trigger the emergence of appropriate

organizational competences and processes, which would facilitate effective adoption and successful use of IT. We also recommend that SMEs owners-managers should champion the implementation of various operational IT applications (for ex. knowledge sharing systems such as SharePoint) to enhance many non-technological competencies to develop the required IT-based competencies.

The main limitation of this study might be that it attempts at generalizing only from empirical statements to theoretical statements from three case studies (Lee and Baskerville, 2003). However, it has been shown that statistical, sampling-based generalizability may be an unsuitable goal for qualitative studies (Yin, 2013). The takeaways from these three cases in the Canadian clothing industry should be transferred to other contexts for further refinements that would eventually offer statistical generalizability. Looking at different industries may also help overcome this limitation and provide new understandings.

This study with its focus on the multi-dimensional nature of DC is well timed. While providing only exploratory results in a specific geographically area and industry, this study offers enough pertinent information to policy makers and industry leaders wishing to understand some of the reasons why certain SMEs lag in the adoption of IT. Hopefully, IT local vendors and financial institutions in areas where efforts are made to strengthen SMEs' technological aspirations may benefit from the results of our study.

Finally, the theoretical explanation offered here opens avenues for more in-depth explorations of some of the more complex processes associated with the dynamic relationship between the social aspects (employees) and the material aspects (IT) of organizational change in a SME context. Alternative perspectives such as sociomateriality (Leonardi, 2013), could be used to shed further light on, for example, how practices of digital competence development emerge through IS use processes rather than being systematically configured through training at a particular moment in time. We argue that, in taking this approach, a more systematic analysis can be performed to examine how technologies, people, and organizations continuously interact.

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