Value co-creation through digital service capabilities: the role of human factors

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Abstract

Purpose – The purpose of this paper is to explore the different human factor characteristics that are emphasized when co-creating value through digital service capabilities.

Design/methodology/approach – Empirical data are gathered from two small companies that deliver digital services and products in business-to-business markets.

Findings – The study highlights the role and importance of human factors as reflected in employees' customer orientation while delivering digital service capabilities. The role of human factors also changes during the digital service production process.

Originality/value – Developing digital service capability is positively associated with value co-creation, but it requires new skills: firms need to evaluate their mechanisms for supporting continuous learning about the properties of digital technologies. To the authors' knowledge, this is the first study to focus on the role of human factors in in developing digital service capabilities.

Keywords Competences, Co-creation, Small and medium sized enterprises (SMEs), E-service, Services operation and management

Paper type Research paper

1. Introduction

Digitalization has permanently altered product and service delivery, markets and customers. Businesses are responding to this change by focusing on the development of digital service capabilities, which enables companies to achieve better relationships with customers, and thus contribute to value creation (Rust and Lemon, 2001). Digital service capabilities are highly similar to value creation and service components: technology, people, information and business resources (Spohrer *et al.*, 2007; Maglio *et al.*, 2009; Chuang and Lin, 2015). After all, organizations are run by individuals. Business is interested in examining which resources should be emphasized in different digital environments. Although prior studies have indicated that a company's digital service capability is positively associated with value co-creation (Eng, 2008; Oliveira and Roth, 2012), developing the capability requires companies to evaluate the mechanisms they use to support continuous learning of digital technologies (Nylén and Holmström, 2015).

The role of small, specialist companies has become more significant in delivering digital services and products. This is because the acquisition of software development expertise is carried out to a greater extent by outsourcing it to smaller companies with special expertise (cf. Tsai *et al.*, 2013). It is documented that outsourcing is one fast way for firms to acquire flexibility and gain IT functions and resources (Agarwal and Sambamurthy, 2002). Companies that lack IT capabilities and experience may not have the time to play catch up by building customized solutions; thus, leveraging outsourcing to fill those gaps (Cheon *et al.*, 1995), becomes the logical or, sometimes, the only choice

(Tsai *et al.*, 2013). Moreover, it is commonly recognized that digital business can be accessed with lower financial resources compared to traditional industry, which offers an avenue to a large number of small businesses. Access to the internet has increased substantially during the last decade, and the percent of operators who make purchases online has grown considerably, which emphasizes the need to study the value co-creation of digital services (Griffis *et al.*, 2012). Williams *et al.* (2010) define digital services as services that are arranged through a digital transaction over internet. Although such service may include digital elements, not all elements or interactions are required to be digital. This makes human factors a crucial aspect of providing value through digital service capabilities. According to Skaggs and Youndt (2004), human factors in business environments manifest as customer co-production, customer contact, service customization, etc. Human factors related to competence include, for example, knowledge, skills and abilities, whereas those related to behavior include, for example, control and coordination (Wright and Snell, 1991).

In line with the notion that value co-creation is important to enhancing business value, digital service providers need to unlock the value of their human factors to accelerate growth in a challenging marketplace. Regarding the small companies in digital service business, the role of human factors can be further emphasized. In the selection of service providers, the corporate image and reputation are emphasized, and they are also associated with the development of trust (Huang *et al.*, 2015; Parasuraman *et al.*, 2005). Smaller companies have to work harder than large companies to gain trust, reputation and image, because large companies have usually already achieved these factors. Small businesses need to take advantage of their human factors, such as, knowledge, skills and abilities (Wright and Snell, 1991), in order to gain trust, reputation and image. However, human factors in the context of digital services are an unexplored area, especially the extent to which they influence value co-creation from a company's perspective.

By dividing digital service capabilities into service orientation, market orientation and customer orientation (e.g. Lynn *et al.*, 2000; Eng, 2008; Oliveira and Roth, 2012), the present study aims to explore the different human factor characteristics that are emphasized in the process of co-creating value. Empirical data are gathered from two small case study companies that deliver digital services and products in a business-to-business (B2B) setting. In B2B setting, the customers are familiar with the service provider, and the service provider has a lot of information about their customers. Further, the service providers in this study are not one-time suppliers but strive for long-term customer relationships. The lengthy cooperation enables the partners to share private information, decrease information asymmetries and facilitate the development of trust (Poppo *et al.*, 2008). The statements above justify the data collection from the representatives of the service provider, because they were considered to have enough knowledge and understanding about value co-creation in digital services. As a contribution, the study identifies not only the human factors that are crucial to value co-creation in a digital services context but also at which stage of the digital service production they are emphasized.

The paper is structured as follows. Section 2 presents a review of prior research on value co-creation, digital service capabilities, and the role played by human factors. Section 3 describes the research methodology. Section 4 presents the different human factor characteristics that are emphasized when co-creating value through digital service capabilities. Section 5 presents a discussion of the findings, and Section 6 presents the conclusions, limitations and direction for future studies.

2. Literature review
2.1 Value creation and co-creation
The term value can be classified into value-in-use and value-in-exchange, which reflect the different ways of thinking about value creation (Vargo *et al.*, 2008). The traditional view of

value creation, linked to goods-dominant logic, is based on value-in-exchange in which companies create value usually through the exchange of products and goods (cf. Vargo and Lusch, 2004). Value-in-use is related to service-dominant logic where the roles of producers and customers are not distinct; thus, value is co-created (Vargo and Lusch, 2008; Vargo *et al.*, 2008). Shifting the locus of value creation from exchange to use implies reinterpreting the notion of value – from one based on units of organizational output to one based on processes that integrate resources (Vargo *et al.*, 2008), as seen in service production.

Service refers to the application of competence for the benefit of another: it involves applying competences, integrating the applied competences with other resources and determining the benefit (meaning value co-creation; Maglio *et al.*, 2009). Value co-creation in services can be defined as a service system that is an arrangement of resources (e.g. people, technology and information) connected to other systems by value propositions (e.g. Spohrer *et al.*, 2007; Maglio *et al.*, 2009). In service systems, a company's role in value creation and the proposition and provision of service is intermediary to the value co-creation process. A service system's function is to make use of its own resources and the resources of others to improve its circumstances and that of others (Vargo *et al.*, 2008). In value creation and co-creation, the roles of the company and the customer can be analyzed using the three spheres: provider, joint and customer (Grönroos, 2008, 2011; Grönroos and Voima, 2013). In the provider sphere, the company is in charge of the production process, which mostly involves the generation of potential value – or value facilitation. In this sphere, resources for customer use are developed, designed, manufactured and delivered without any direct interaction with the customers (Grönroos, 2008, 2011; Grönroos and Voima, 2013). In the joint sphere, the role of the customer is twofold: he/she co-produces resources and processes with the company and the jointly creates value with the company. Through direct interactions with the customer, the company may have an opportunity to engage with the customer's value creation process and assume the role of a value co-creator. In the customer sphere, when there are no interactions, customers are engaged in independent value creation, using resources obtained from a company and those that are otherwise necessary and available to them (Grönroos, 2011).

McCormick (2013) explains that digital services play a critical role in how companies position their value proposition (McCormick, 2013). A new digital service can deliver embedded value to companies through the co-creation of services and products with customers, who represent a key value component. Chuang and Lin (2015) studied financial service companies in Taiwan, and showed that the impact of new digital services on company outcomes begins with digital service and cooperation capabilities, and that the complementarity between these factors positively influences new digital services. Further, they confirmed that new digital services exert a positive effect on value co-creation, thereby improving company value. According to Chuang and Lin (2015), digital service capability is deployed throughout a company and is integrated deeply with customer-based collaborative processes, leading to higher levels of cooperation and co-creation capability. They argue that companies using information technology-based services have more access to customer information owing to customer–company collaboration and interaction via the internet. Access to and integration of this information allows companies and their employees to better absorb information, coordinate with customers and collaborate with them to improve service delivery and tailor services to demands (Chuang and Lin, 2015). Thus, co-creation between customers and suppliers represents a critical component of service-delivery processes through which customers directly influence the development of both regular and digital services (Ngo and O'Cass, 2009; Chuang and Lin, 2015; Saunila, Rantala and Ukko, 2017).

2.2 Value co-creation and digital service capabilities
A digital business aims to change the existing business environment from a holistic and customer-driven perspective. This change is effected through digitization of processes and development of digital services (cf. Saunila, Rantala and Ukko, 2017). Digital service

capabilities are connected with technological capabilities embedded in the process through which services are delivered and information is presented to customers. As Ba and Johansson (2008) showed, the technological capabilities embedded in digital service processes are the key factors that determine service quality and, ultimately, customer satisfaction. This finding links back to Teece and Pisano's (1994) dynamic capabilities theory. They defined dynamic capabilities as the "subset of the competences or capabilities which allow the company to create new products and processes and respond to changing market circumstances." Thus, competitive advantage is viewed as based on distinctive processes, shaped by the companies' asset positions and the evolutionary paths it follows. As an alternative to competencies, Zollo and Winter (2002) identified operating routines as the foundation on which dynamic capabilities operate. They highlighted that dynamic capabilities are structured and persistent; using fragmented approaches to developing operations or creating value is not exercising a dynamic capability. Further, dynamic capabilities emphasize management capabilities and inimitable combinations of resources that cut across all functions (Teece and Pisano, 1994). These capabilities' value lies in their ability to translate resources to value (Eisenhardt and Martin, 2000). As a key mechanism for organizational growth and renewal, digital service is implicitly central to this theory. Similarly, Chuang and Lin (2015) consider digital service capabilities as an internal driving force that enables companies to better understand its customers, improve its service delivery and respond to customer needs.

Further, dynamic capabilities theory is well-suited to the study of digital services for the following reasons. First, there is no special focus on technological resources. Capabilities are promoted, analyzed and developed by employees of the company. While the competencies and resources of the company matter, the individuals working in the company are the ones that create value. Second, dynamic capabilities are those that are able to extend, modify or create capabilities that are beyond the everyday competencies and resources. Especially in B2B setting, the digital services can vary; they can relate to products, service processes or even business models. Moreover, due to this heterogeneity, there is no general formula for how to create digital services.

To develop an understanding of the determinants of digital service capability, this study examines how a company's orients its organizational activities in an attempt to develop customer value. Accordingly, digital service capabilities are divided into three categories: customer orientation, market orientation and service orientation (e.g. Lynn *et al.*, 2000; Eng, 2008; Oliveira and Roth, 2012). These orientations can enhance a company's service capability by enabling it to acquire knowledge about customers and other market participants, share that knowledge within the company, achieve consensus on its meaning and take steps to deliver superior customer value (Eng, 2008). Each of these categories of orientations is described below.

2.2.1 Customer orientation. Customer orientation refers to the company's ability to manage its relationships with its customers in both virtual and physical spaces and to create and retain loyal customers (Oliveira and Roth, 2012). Customer orientation comprises functional and relational aspects (Homburg *et al.*, 2011; Miao and Wang, 2016). The functional aspect pertains to task-oriented sales behaviors aimed at solving business problems, while the relational aspect targets forging a strong personal relationship with customers (Homburg *et al.*, 2011). The key to customer orientation is addressing customer feedback and suggestions (Zhu *et al.*, 2015) and continuously identifying and meeting the customers' needs to gain sufficient knowledge to generate superior value (Ruch and Sackmann, 2012). Further, Setia *et al.* (2013) suggest that the customer orientation requires capabilities to reflect as well as preparedness for and awareness of customer requirements. Also central to customer orientation is the organizational belief that understanding and responding to customer needs continuously will result in positive outcomes both for the customers and themselves (Joshi, 2016).

2.2.2 Market orientation. Market orientation reflects a company's understanding of the business environment, the market, the competition and other factors external to the company (Oliveira and Roth, 2012; Boso *et al.*, 2013; Gao, 2017). The ability to create and develop new products/services and enhance existing ones is also crucial to a successful market orientation (Oliveira and Roth, 2012). Additionally, market orientation can refer to the mindset of a company or to concrete instruments that pertain to the actual and latent needs and wants of individual customers, existing or potential (Urde *et al.*, 2013; Zhu *et al.*, 2015). This orientation includes a company's ability to leverage absorbed knowledge from partners and apply new knowledge, exchange knowledge across various platforms and combine knowledge from various sources, and develop cross-functional platforms that facilitate transfer of information (Chuang and Lin, 2015).

2.2.3 Service orientation. Service orientation can be conceptualized at different levels, such as individual, strategic and organizational (cf. Tung *et al.*, 2014; Popli and Rizvi, 2015). The individual level considers whether an employee is more service-oriented than other members of the staff (Tung *et al.*, 2014). At this level, service orientation can be considered a personality trait or what employees do for service delivery (Popli and Rizvi, 2015). The second level is related to business strategy. It refers to the extent to which a company is service-oriented in terms of its marketing strategy (Homburg *et al.*, 2002). At the organizational level, service orientation can be considered an organizational philosophy or a part of the organizational culture and climate (Lynn *et al.*, 2000; Popli and Rizvi, 2015). It represents whether a company establishes and delivers excellent service (Tung *et al.*, 2014). Oliveira and Roth (2012) consider service culture and processes to be important factors of service capability. Service culture refers to a sort of corporate promise that all the company's employees will provide exceptional customer service. Service processes are the key processes designed and managed to deliver service, e-service and higher productivity. Thus, service orientation is connected to the norms, beliefs, values and behaviors of a company (Popli and Rizvi, 2015). Chuang and Lin (2015) use the term "e-service capability" to describe technology resources, human resources and business resources that are crucial to developing such orientation. Technology resources refer to a company's information technology infrastructure, human resources are representative of the managerial support and company culture that embraces these initiatives, and business resources refer to the extent to which the e-service permeates a company (Chuang and Lin, 2015).

2.2.4 Summary of the digital service capabilities. Table I presents a summary of the characteristics of digital service capabilities (in terms of customer orientation, market orientation and service orientation).

Previous studies have indicated that digital service capability is positively associated with value co-creation (cf. Eng, 2008; Oliveira and Roth, 2012; Chuang and Lin, 2015). This requires new skills: companies need to evaluate the mechanisms they use to support continuous learning about the properties of digital technologies (Nylén and Holmström, 2015). Companies also need to assess the available space and time for improvisation and the mechanisms for coordinating such efforts. The next section presents the human factors that play a crucial role in value co-creation.

2.3 Human factors in value co-creation

As previously mentioned, in service systems cooperation is characterized by the relationships among people, service processes and physical elements (Tax and Stuart, 1997). This highlights the importance of understanding the barriers to developing digital service capabilities and the role that human factors play in creating value (cf. Cao *et al.*, 2016). Human factors refer to the characteristics of individuals that affect how they function in an organizational context (Carmeli and Tishler, 2004a), and they may have diverse motivation,

Digital service capabilities	Description	References
Customer orientation		
	Focusing on understanding and responding to customer needs continuously. It includes	Eng (2008), Oliveira and Roth (2012), Ruch and Sackmann
	understanding how customers value products and services	(2012), Homburg *et al.* (2011), Setia *et al.* (2013), Chuang and
	setting customer satisfaction objectives	Lin (2015), Joshi (2016) and
	preparedness, reflection, awareness	Miao and Wang (2016)
	identifying customers' needs	
	task-oriented sales behaviors to help solve the customer's problems	
	establishing a strong personal relationship with customers	
Market orientation		
	Ability to understand the business environment, the market, the competition, and other factors external to the company.	Eng (2008), Oliveira and Roth (2012), Boso *et al.* (2013),
	It includes	Urde *et al.* (2013), Chuang and
	understanding how everyone can contribute to creating customer value	Lin (2015), Zhu *et al.* (2015) and Gao (2017)
	paying close attention to after-sales service	
	setting customer satisfaction objectives	
	ability to create and develop new products/services and enhance existing ones	
	absorbing knowledge from partners and applying new knowledge	
	exchanging knowledge across various platforms and combining knowledge from various sources	
	developing cross-functional platforms that facilitate the transfer of information	
Service orientation		
Strategic level	The service orientation of a firm as reflected in its marketing strategy. It includes	Homburg *et al.* (2002), Eng (2008), Oliveira and Roth
	implementing strategies to compete successfully	(2012), Tung *et al.* (2014),
Organizational level	Organization culture that establishes and delivers excellent service. It includes	Chuang and Lin (2015), Popli and Rizvi (2015) and
	the norms, beliefs, values and behaviors of an organization that influence employee performance	Zhu *et al.* (2015)
	the message that all employees should provide customer service to all customers	
	the key processes designed and managed to deliver service, e-service, and higher productivity	
	managerial support	
Individual level	Employee's service orientation *vis-à-vis* other members of the staff (service orientation as a personality trait, and as what employees do for customer service). It includes	
	listening to what customers have to say	
	always putting customers' interests first	
	giving personalized attention to all customers	

Table I.
Description of digital service capabilities

experiences and ability to manage relationships with other actors (Cao *et al.*, 2016). Human factors may enhance a company's dynamic capabilities, thereby contributing to the company's ability to create and reconfigure resources to meet shifting demands and attain a sustainable competitive advantage (Carmeli and Tishler, 2004a). Interestingly, human

factors have not yet been examined in the context of digital services, especially how they influence customer value creation from an organizational perspective.

The idea that a company's members are the real source of its competitive advantage has long been acknowledged (cf. Pfeffer, 1994; Carmeli and Tishler, 2004a; Kuo, 2011). Previous studies have indicated that human factors are also important in achieving higher organizational performance (e.g. Carmeli and Tishler, 2004b; Hatch and Dyer, 2004; Saunila *et al.*, 2015; Saunila, Rantala, Ukko and Pekkola, 2017). For example, Skaggs and Youndt (2004) found strong empirical evidence to indicate that factors such as customer co-production, customer contact and service customization are related to human factors. This suggests that the inclusion of human factors in the company's strategic positioning produces positive organizational performance.

Human factors can be categorized into competence and behavior. Competence factors include knowledge, skills and abilities, whereas behavior factors include behavior control and behavior coordination (cf. Wright and Snell, 1991). According to Wright and Snell (1991), behavior control refers to inducing specific behavior in individuals working on independent jobs, and behavior coordination refers to coordinating individuals whose jobs are interdependent. Azim *et al.* (2010) have proposed a similar division between hard and soft skills, where the former refers to processes, procedures, tools and techniques and the latter to the skills used to dealing with people. Table II shows the division of human factor characteristics utilized in this present study.

3. Research methodology

3.1 Research strategy

As this study aimed to gain insight about the different human factor characteristics that are emphasized in the process of co-creating value in the B2B context, the qualitative approach was employed. As presented previous, human factors refer to the characteristics of individuals that affect how they function in an organizational context (Carmeli and Tishler, 2004a), and they may have diverse motivation, experiences and ability to manage relationships with other actors (Cao *et al.*, 2016). In order to get depth understanding about these characteristics of human factors, the phenomenon was explored in real context and in face-to-face interviews with individuals from case companies. Qualitative case studies are used to gain an understanding of phenomena that have complex and multiple variables and processes (Yin, 2003). Single cases provide researchers with access to a situation that was previously inaccessible; therefore, the descriptive information itself is insightful (Yin, 2003). Another benefit of using case studies is that the methodology offers in-depth information on processes (Gummesson, 2000). The case study method is also an approach that enables a researcher to apply various qualitative and quantitative research

Human factors		References
Experience and implicit knowledge	Employees with suitable work experience	Wright and Snell (1991), Carmeli and Tishler (2004b) and Cao *et al.* (2016)
Skills and roles	Employees who are well-trained with suitable education well-skilled professionally thoroughly familiar with their tasks, tools and procedures	Wright and Snell (1991), Carmeli and Tishler (2004b) and Azim *et al.* (2010)
Attitude and ability	Know their job understand the various consequences of their actions job mastery ability to deal with others	Wright and Snell (1991), Carmeli and Tishler (2004b), Azim *et al.* (2010) and Cao *et al.* (2016)

Table II.
Human factors in value co-creation

methods, such as analyzing archives, conducting interviews or using questionnaires (Gummesson, 2000). The mentioned reasons were also the researchers' motivation to utilize qualitative research and case studies as a research strategy of the study. Because of the exploratory nature of the present study, the case study method was deemed appropriate for investigating the importance of the less studied phenomenon in practice. The lack of existing theory on the different human factor characteristics emphasized when co-creating value through digital service capabilities also supported the use of this qualitative method. This study is guided by the principles of abductive reasoning, which is used to develop a theory by understanding and interpreting a phenomenon (Kovács and Spens, 2005).

With regard to the present case study, the review of the extant literature revealed a little practical knowledge about the role that the human factors of digital service providers play in creating value through digital service capabilities. For example, Voss *et al.* (2002) suggested that the phenomenon can be studied in its natural setting, because meaningful and relevant theory can be generated from observing and understanding actual practice. They also emphasized that the case method is useful when the variables are unknown and the phenomenon is not fully understood. In line with this, the present case study provides new, practical information regarding the role of the human factors of digital service providers. Finally, the study can be considered as a revelatory case (Yin, 2003); that is, a researcher involved in this study had an opportunity to observe and analyze a previously inaccessible phenomenon.

3.2 Case selection
As a part of providing digital products and services, companies are currently relying more often on outside service providers, and the trend seems to be growing (Davis *et al.*, 2006; Haried and Ramamurthy, 2009). Levina and Ross (2003) stated that most research on IT outsourcing concludes that companies are utilizing outsourcing strategies because they believe that outside service providers can generate value and production cost advantages. According to Tsai *et al.* (2013), outsourcing represents a special case of sourcing activities in which companies' make or buy decisions are related to the acquisition of business processes and digital services, as well as to the acquisition of software development from service providers (cf. Bardhan *et al.*, 2007; Whitaker *et al.*, 2010). Even though the role of customer's company and the relationship between customer company and service provider have been topics of academic interest, the service provider's perspective remains less studied. Levina and Ross (2003) increased the empirical-level understanding of service provider companies' strategies and practices in one long-term, successful, applications-management-outsourcing engagement. One of the future research aspects suggested by the authors was to gain more empirical-level understanding of service provider companies' roles and strategies when delivering value through digital products and services.

Based on the statements above, the current study examines and provides insights into the role that human factors of small service providers play in co-creating value through digital products and services. In order to understand the co-value creation practices in natural settings, two small digital service providers were investigated. These two companies were selected because both companies are typical vendors of the time but operate with slightly different business models. This is explained in detail in the next section.

3.3 Case descriptions
The insights are derived from two case studies of small, rapidly growing Finnish companies that provide digital services and solutions. Both companies are examples of contemporary IT companies that are pursuing the outsourcing of tasks, as well as outsourcing customer companies' orders, and they also play an important role in the digitalization of traditional

industrial processes with huge potentials for generating new jobs and economic growth. The basic nature of digitalization in service production is similar in both the case study companies. The digital service process is partly digital and partly physical at the front end. At the back end, all the services and solutions are offered in a digital format. The physical aspect of the digital service process highlights the need to understand the characteristics of human factors that are emphasized when co-creating value through digital service capabilities.

3.3.1 Case company A. Case company A is an IT company that employs 20 people. It focuses on supporting its customers' operations and businesses in a digital environment. As a fast-growing company, it offers a wide range of digital services, including software for customer relationship management and enterprise resource planning, application development, e-commerce solutions, design services and data center services. Its digital services and solutions are strongly based on customization and versatility, because it aims to build long-term customer relationships instead of one-time deliveries. While the company initially had technology-oriented focus, it is current focus, especially given its future plans to emerge as a long-term supplier, is on the role played by human factors.

A total of five people from company A, with different responsibilities and job descriptions, were chosen for the interviews to obtain a holistic picture of the role of human factors. Two of the five interviewees also participated in workshops.

3.3.2 Case company B. Case company B is an IT start-up that employs 15 people. It offers solutions and services to support the sales and manufacturing plans of its customers. The company provides digital sales solutions; for example, it integrates its products into its customers' processes to help them understand their customer processes and challenges. The company also provides administrative support services to its customers to help them control and manage their industrial plans. The digital solutions transform the physical environment into a virtual model where processes, documentation and related machinery can be explored. The company also aims to support and develop its customers' operations in the long-term. In addition to increasing sales, the company intends to enhance human performance and reduce human errors by digitalizing and simulating processes, operations and machines in industrial environments.

At company B, three people with different job descriptions and responsibilities were chosen for the interviews to obtain an understanding of human factors that create value through digital service capabilities.

Even though both companies rely strongly on digital services, some differences exist in their business logics: Case company A offers a wide range of digital services, and their business model is based on customization and versatility; case company B offers industrial solutions including customizable modules that can be configured to the needs of the customers. While the offerings of both companies are digital in nature, their human factors and interactions with customers play significant roles, especially in service delivery. This why these companies were chosen as case studies to explore the different human factor characteristics emphasized when co-creating value through digital service capabilities. The two different cases were not used to perform a comparative study of the phenomenon but to gain a deeper overall understanding of the phenomenon.

3.4 Data sources and collection

In order to get as in-depth an understanding of the phenomenon as possible within the case companies, different types of data collection methods were utilized. Table III presents the data used in this study. The primary empirical data for this study were obtained from eight semi-structured interviews. The interview questions were determined in advance based on prior literature, but the discussions were informal and were facilitated with supporting questions and comments made by the researchers. This enabled an in-depth

	Participants	Method	Data	Utilization in analysis and reporting
Primary data				
Case A	Five people (representing the management and employees)	Interviews	Recorded and transcribed interview data	Defining the characteristics of digital service capabilities
				Defining the characteristics of the human factors related to digital service capabilities
Case B	Three people (representing the management and employees)	Interviews	Recorded and transcribed interview data	Characteristics of digital service capabilities
				Characteristics of the human factors related to digital service capabilities
Secondary data				
Case A	Two representatives Researchers	Workshop (3 sessions)	Documented workshop discussions Observations of the workshop	Clarification of the development goals
				Clarification of the results of the interviews in terms of human factors and value co-creation
				Synthesis of the development work in terms of human factors in co-creating value through digital service capabilities
Case B	Representatives of the management and two customers The entire staff Researchers	Workshop (2 sessions)	Documented workshop Observations of the workshop	Clarification of the development goals
				Clarification of the results of the interviews in terms of human factors and value co-creation
				Synthesis of the development work in terms of human factors in co-creating value through digital service capabilities

Table III.
Data
collection process

understanding of the phenomenon under investigation. As our goal was not to achieve scientific generalization, theoretical concepts were used as templates with which to compare the empirical results (Yin, 2003). The aim of the interviews was to achieve an overall understanding of the value creation process and the role that human factors played in the process within the context of digital services. Specifically, the interviews attempted to increase the understanding of digitalization opportunities, the possible challenges created by digitalization, the value factors that the case companies based their business on, and how human factors were related to each company's value creation process. All the interviews were recorded and transcribed to facilitate an in-depth analysis.

To increase the researchers' understanding, secondary data were collected from observations at digital service capabilities workshops, and documentation from the workshops during the ongoing research process. The issues and themes for the workshops were selected beforehand, but the discussions were informal and facilitated by the researchers. Similar research processes were used in both case studies to ensure scientific transparency and repeatability. The actual process of collecting secondary data consisted of three main phases: clarifying the goals of development, clarifying the formation of the value through the provided services and solutions and the role that human factors played in them and synthesizing the development activities based on the defined goals in both case companies.

To arrive at the findings, cross-case analyses were conducted. The analysis was conducted with the help of three researchers. Research triangulation, as well as data triangulation, was used to analyze the content, after which a common interpretation of the results was discussed.

4. Results
This section presents the different human factor characteristics that are emphasized when co-creating value through digital service capabilities. The results are summarized in Table IV.

Digital service capabilities	Human factors		
	Experience, implicit knowledge	Skills, roles	Attitude, ability
Customer orientation	Experience of combining and synthesizing relevant aspects from multiple places Behavior toward open communication Behavior toward managing personal dynamics Face-to-face communication experience Building trust Experience in supporting customer change process Facilitating culture of openness	Skills to combine and sum relevant aspects from multiple places The means to keep the customer up to date Face-to-face communication skills The means to support customer change process	Attitude toward keeping the customer up to date Building trust Attitude toward supporting customer change process
Market orientation	Experience of finding external partners Exploring new possibilities	The means to find external partners	Keeping up with constant development Attitude toward new possibilities
Service orientation	Behavior toward understanding the customer's position Ability to understand the customer's wants	Skills to balance the customer's wants and technical feasibility	Attitude toward empathizing with the customer Listening to the customer's wants

Table IV.
Summary of the
findings on human
factor characteristics

4.1 Human factors in customer orientation

The role of human factors in customer orientation was strongly highlighted at the front end of digital service production. Being able to create the best possible and the most suitable solution for each customer by delivering value through customer orientation was considered crucial in both case study companies. Employees, as experts in their fields (digital solution and service development) with different skills and roles, complemented each other and assisted in building the customer experience and co-creating value.

The ability and skills to combine and summon relevant elements from multiple places were highlighted. Many of the customers' wishes and suggestions were in digital form and therefore easily controllable. The consequence of this was that employees sought more refined information. Aligning customer's wishes and suggestions was identified as a challenge. Combining information from multiple internal systems was considered difficult. The challenge was not how to combine information but what to combine. For example, the managing director of a case company said:

> There is so much information available, so much to understand what to refine. And we have many different channels from so many sources in small pieces.

The ability and skills to keep the customer informed were emphasized in interviews. For example, any problems in the automatic updating of software versions should be communicated immediately to the customer. The customer experience must be carefully heard and understood. At the point when problems arise, the customer should know what happened and why.

The behavior factors of the employees engaged in communication were also emphasized in the interviews. The ability to communicate with the customer in plain language was considered important. For example, a digital content developer of a case company said the following:

> It could have been instructed that this is where you can speak in just a mother tongue. In some situations, you are afraid that the customer knocks on the other end, without saying that half of the contents went past now.

Another behavioral factor relating to communication was managing personal dynamics. Customers report a bad experience when they do not get along with someone, and this may lead to poor communication. For example, another digital content producer from a case company said:

> It also pushes away communication, and in that sense the customer stays silent without saying that this is a problem and I would like to change the contact person or that the matter will be resolved.

The ability and skills to engage in face-to-face communication were highlighted in the interviews, especially in the front end phase of the larger projects. In very large projects, developing and understanding the big picture were perceived as difficult. The common perception was many aspects were difficult to express and reflect in the digital world and even more difficult to explain through digital channels. For example, an operative service expert from the case company indicated:

> So that you're face-to-face with that person or team, and you can go through the things and you can explain, and even draw and show. It's quite different, I mean the communication, compared when you're talking to someone over Skype.

A long-long lasting relationship with customers calls for the ability to build trust. Hence, to promote and support the human factor of customer orientation, both case companies agreed that companies should focus on creating a corporate culture that engages the customer in developing and constructing digital services and solutions and thus increase their trust in sharing information.

In particular, at the start a relationship, customers expect to know who they are working with. In fact, employees of the case companies explained that some trust needed to exist for a customer to establish contact through a digital channel. That is, a customer should have heard about the company from other sources. Customers' trust levels were perceived to be high in situations where they did not know alternative solutions or solution providers to their problems. The ability to manage time was considered crucial in such cases. For example, a digital content developer of a case company said:

> Yeah, it's pretty often that we need to be confident that we can handle the situation and, usually, time is often a critical in the digital world, so if you want something, it's usually pretty fast, meaning that things should have been done yesterday and we often say, really often, that time lag will come.

It, thus, enables digital service and solution providers more deeply to understand of what aspects customers appreciate in constructed solutions and makes it possible to co-create value.

The ability to support customers through a change process was also strongly highlighted in the interviews. This requires the ability to abandon old operating models and methods. Major resistance to change was noted, at least in the manufacturing industry, in digitizing materials such as service manuals and user guides that have traditionally been considered as physical objects. The ability to support customers through change processes is linked to the ability to increase co-creation and build a culture of openness. For example, the chief operating officer from a case company said:

> Let's say that we have been, I can't say lucky, but we do not have coded a single line of our systems without it being done with the customer and for that reason, we know now that we have not been foolish enough to have developed a devious, functional system that no one can use then in their own activities.

Co-creation facilitates a culture of openness as well as trust. This is essential because the development of digital solutions requires considerable information about the customer's internal systems and procedures and often open source coding, and such a culture enables it. Digitalization requires customers to change their old ways of working, and a service provider can play a major role in this change. The service provider's experience gained from prior projects can go a long way in facilitating this change.

4.2 Human factors in market orientation

As the case companies operated in a knowledge-intensive sector and the employees were experts in their specific fields (digital solution and service development), the role of human factors in market orientation was not considered as strong and meaningful as it in the other digital service capabilities. Responses suggested that understanding of market changes primarily increased through interaction with customers and their production process.

The ability to constantly develop or innovate is especially important in a digital environment, because it is easy to switch providers. Interviewees in the study felt that constant innovation required actively seeking customer feedback on how things could be bettered. For example, sales skills should focus not only on the products but also the refining skills related to future development. Proactive seeking feedback was perceived as a desirable attitude whereas waiting for something to happen was considered the worst approach.

The ability to explore new possibilities was also highlighted. This pertained to finding new customers as well as new products and solutions. Interviewees identified that the ability to utilize tacit knowledge was instrumental to identifying new business areas and models, providing agile solutions to their customers and ensuring the satisfaction of the customers and themselves. This ability also helps in selling to other customers, who are likely to be equally satisfied. For example, a digital content developer of a case company said:

> We will be left behind if we are doing the same all the time. We must provide the customer something they do not ask or understand to ask and it works so that they can give some way of directing what they want. We still have to move forward to offer them more than what it asks for.

Find external partners whose expertise could be exploited for developing digital service offerings were perceived as important. Employees agreed that this will allow the companies to serve entities and even aid the development of a completely new business. Understanding one's own competence and the strength of one's partners was considered an important trait. For example, a digital content developer of a case company explained:

> The customer may have a pre-existing system in which we do not have a solid experience in our house. And it's not profitable to waste a customer's time to train a person, when we know that there is a neighboring guy who can help us here.

Thus, the ability to create and develop new products/services and enhance existing ones was realized through customer orientation. It was not based on the employee's orientation toward the business environment but rather the strategic orientation of the company.

4.3 Human factors in service orientation

Service orientation was also emphasized in the responses. Both the case companies offered a complete range of digital services and solutions. The significance of human factors in co-creating value was evident not only in the development but also in the maintenance and updating of the solutions. Both companies improved customer value through personal contact after the actual service production phase. In both cases, this was considered to increase the customers' willingness to participate in the process. Although the cooperation was mainly digital, highly personalized services are known to increase the importance of human factors in value creation.

For example, the need to empathize with the customer was highlighted in the interviews. This referred to knowing the person who used the delivered service. Interviewees believed that the actual internal development and update should be invisible to a customer. This could only be achieved by understanding the customer's needs. For example, a digital content developer of a case company said:

> I would see that we do not have encoders that are purely steering straightforward, but everybody here seeks to see or can see at some stage justifying their case always by the needs of their customer.

The customers should be treated as individuals and the best solutions for each customer should be identified. Such situations can be used to develop the best practices that can then be utilized in other customer relationships. The ability to sense the customer's feelings is thus emphasized.

The ability to listen to the customer's wants was also considered important. Before anything is defined, the first goal is to see what services are best suited to a customer. A digital content developer of a case company summarized:

> We cannot, we do not sell you like here is a product, buy it […] but sell it so we will first ask you what you want.

Overall, this aspect refers to a solution provider's ability to balance the customer's wants and technical feasibility. Complex problems need to be identified in a timely manner, and increased cooperation and interaction with the customer must be solicited. A slightly negative feedback from the customer was perceived the most useful. While service providers test software, a good practice is also to let the customer test it. This works well especially if the customer has been involved in the development work, thus understanding and tolerating minor weaknesses.

The ability to monitor and understand customer behavior and utilization of the implemented solutions was also highlighted. This requires desire and interest from both the service provider and the customer. The ability to get real-time information on usage levels and times enables rapid development. In addition, qualitative information on user experience is needed, both for usability and proven benefits. This implies customers should be interested and willing to co-operate and co-create.

5. Discussion

The main aim of this study was to understand the characteristics of human factors that are emphasized when co-creating value through digital service capabilities. To that end, digital service capabilities were examined by categorizing them into service orientation, customer orientation and market orientation. The study findings indicate that the studied human factors are mainly emphasized in the facilitation of customer orientation and service orientation. Market orientation is not a core factor, when focusing on the human factors that facilitate value creation through digital service capabilities.

The results showed many customer-orientated digital service capabilities enable value co-creation and that they can be facilitated by a variety of human factors. The study thus strongly supports the findings of Eng (2008) and Oliveira Roth (2012), who found that a company's digital service capability is positively associated with value co-creation. The role of human factors in the facilitation of digital service capabilities can be discussed in the form of competence factors and behavior factors (Wright and Snell, 1991), where competence includes knowledge and skills and behavior includes control and coordination, manifested as attitude or motivation. The results of this study indicated that behavioral factors such as the capability to build trust and the capability to support customer change process are important human factors. These were seen more as a matter of experience, attitude and motivation than skills.

The role of human factors in customer orientation was emphasized by all the respondents. Previous literature has suggested that customer orientation consists of functional and relational aspects (Homburg et al., 2011; Miao and Wang, 2016), where the functional aspect involves task-oriented behaviors to help solve the customer's functional business problems, and the relational aspect focuses on establishing a strong personal relationship with customers (Homburg et al., 2011). As the results of this study show that the ability to keep the customer up to date is important. In this case, for example, automatic updating of the latest software versions refers to skills, whereas immediate communication with the customer refers

to attitude and motivation. This also relates to the other finding that the capability to communicate with the customer in plain language is crucial in a digital environment. It can also be seen as a matter of attitude and motivation toward customer orientation.

As discussed above, both aspects, functional and relational, are important and emphasize the role of human factors when co-creating value through digital capabilities. This logic is in line with the findings of Azim *et al.* (2010), who grouped human factors into hard skills that referred to processes, procedures, tools and techniques, and soft skills that refer to dealing with people. In terms of hard skills, the ability to combine and synthesize relevant elements from multiple places was highlighted. This capability relates to proper skills and experience. With regard to soft skills, the capability of managing personal dynamics was mainly related to behavioral factors, such as attitude and motivation. The capability of face-to-face communication was highlighted in the results, and it can be considered as a combination of experience and skills from the perspective of human factors.

The study also supports the finding of Carmeli and Tishler (2004a) that human factors are individual characteristics that affecting how individuals function in companies, and they may have diverse motivation, experiences and ability to manage relationships with other actors (Cao *et al.*, 2016). This diversity has been discussed above, showing that some of the digital capabilities can be facilitated by, for example, experience and skills, when some of them are linked more on attitude and motivation. In general, it can be stated that the findings are in line with those of Chuang and Lin (2015), showing that the impact of new digital services on company outcomes begins with digital service and co-creation capabilities, and that the digital service capability is deployed throughout a company and is integrated deeply with customer-based collaborative processes, representing higher levels of co-creation capability. As the results show, when focusing on the human factors that facilitate value creation through service capabilities, market orientation is not a core factor. Oliveira and Roth (2012) stated that the ability to understand the business environment, market and competition, and implementing strategies to compete successfully, can be considered as factors related to the market orientation service capability. In this study, market orientation was mainly witnessed at the organizational level, and the role of human factors was identified in the experience of finding external partners and exploring and being open to new possibilities outside the focal company. Finally, in the category of service orientation, the role of human factors was linked to the behavior toward understanding the customer's position and wants and the skills to balance the customer's wants and technical feasibility.

The findings strongly support the importance of developing digital service capabilities from the perspective of understanding the role that human factors play in co-creating value (e.g. Cao *et al.*, 2016). In sum, this study's results contribute to the field by providing evidence that human factors facilitate value creation in a digital service environment through service orientation and customer orientation, rather than through market orientation. Further, the results indicate that although human factors play an important role in the value creation process, they have a stronger impact during the front end phase of production of digital products and services.

6. Conclusions
This study investigated the characteristics of human factors that are emphasized when co-creating value through digital service capabilities. Consequently, one of its main contributions is that human factors play a central role in customer orientation when creating value through digital service capabilities. The study also confirms that both competence factors (such as knowledge and skills) and behavioral factors (such as attitude or motivation) affect how value is co-created through digital service capabilities. It highlights the importance of human factors during the front end phase of digital service production. In the back end phase, all the services and solutions are provided in a digital format; thus,

the role of human factors in creating value is shaped by the maintenance and updating of the solutions provided. Our research suggests that digital service providers should focus greater attention on the learning opportunities that customers can contribute and should employ business-oriented relationships with their customers by creating an understanding of the prerequisites of building trust and supporting customer change process. Thus, the findings of this study extend the current research on digital service capabilities by providing new evidence about the role of human factor characteristics when co-creating value through digital service capabilities.

These findings have important implications for digital service providers, who will need to unlock the value of their human factors that are emphasized when co-creating value through digital service capabilities. First, it seems that investing in developing human factors related to customer orientation is one way to facilitate the value co-creation process. The examples in this study highlight the importance of competence factors and behavior factors in developing digital service capabilities. Second, by creating a bottom-up approach to co-creating value, it is possible to create a positive pressure for developing human factors. This requires managers who are comfortable with giving away their authority and encouraging employee autonomy in the value co-creation process.

Lastly, the study has some limitations that can be addressed in future research. The results are based on data from companies that have their own culture and existing structures for value co-creation; thus, more research is needed to ensure the generalizability of the results. In addition, the results are based on research conducted in two small IT companies, which should be taken into account when the results are applied in practice or further studies. Investigating human factors in a changing digital business environment is a challenge. Although this study overcomes the challenge by using a combination of various data collection methods, more can be learned through observations, additional evaluations of prior practices and changes in the case study companies and investigation of the relationship between the companies and the surrounding digital service systems. For example, future research could examine the role of customers in fostering human factors in digital service settings and how companies can engage customers in developing digital service capabilities.

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