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Customer knowledge as a source of competitive advantage in B2C markets

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Tämän Pro gradu -tutkielman tarkoituksena on määrittää asiakastiedon johtamisen erityispiirteet kuluttajaliiketoiminnassa ja tutkia, voiko asiakasymmärrys synnyttää kilpailuetua kuluttajamarkkinoilla toimiville yrityksille. Tutkimus on toteutettu kvantitatiivisin menetelmin asiakkuuksien johtamisen asiantuntijoilta kerätystä aineistosta. Tutkielmaa ohjaa taustaolettamus siitä, että yritykset eivät kykene tuntemaan kuluttaja-asiakkaitaan henkilökohtaisesti ja ovat täten riippuvaisia tietojärjestelmiin tallennetusta tiedosta. Tutkimuksen teoriaosiossa esitetään hyvä asiakastiedon johtaminen prosessina, jonka lopputuotoksena syntyy korkealaatuista asiakastietoa ja jonka laatua edesauttavat yrityksen organisaationaliset, teknologiset ja inhimilliset tekijät. Tutkimuksen empiiriset havainnot osoittavat, että organisaatioilla, joiden asiakastieto on laadukasta, on kilpailuetu suhteessa markkinan muihin toimijoihin. Lisäksi asiakastietojohdamisen strategia, kannustava kulttuuri, asiakasdatan hallinta, asiakashallinnan teknologiat sekä asiakasymmärryksen osaaminen vaikuttavat positiivisesti asiakastiedon laatuun. Tutkielman lopputuotoksena määritetään viitekehys asiakastiedon johtamiselle kuluttajaliiketoiminnassa. Tutkimuksen tulokset osoittavat, että yritysjohtajien tulisi tunnustaa asiakastiedon merkitys strategisena voimavarana, parantaa johdonmukaisesti asiakastiedon laatua sekä tukea tiedon laatua tunnistetulla edistystekijöillä.

ABSTRACT

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This master's thesis aims to define the characteristics of customer knowledge management in B2C markets and understand if customer knowledge can be a strategic asset for companies as a source of competitive advantage. The research is conducted in quantitative manner with data collected from employees working in customer relationship management positions. Study is structured under the assumption that companies in B2C markets cannot know their customers personally and therefore need structured (explicit) knowledge stored in IT systems. Theory suggests that good customer knowledge management process results in high quality customer knowledge and this quality is enhanced by organizational, technological and human enablers in the organization. Empirical findings of the study show that companies with high quality customer knowledge have also competitive advantage over their competitors. In addition, customer knowledge strategy, supportive culture, customer data governance, CRM technology and CKM competence were found to have positive effect on customer knowledge quality. As an outcome of the thesis customer knowledge management framework for B2C markets is defined. Result suggest that top management should recognize customer knowledge as a strategic asset and systematically improve the quality of their customer knowledge as well as support it with verified enabler factors.

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Writing this thesis has been a roller coaster with its ups and downs. As I started my writing, I received many tips and advice from people around me. Some said that the best thesis is a finished one – and at this point I can definitely agree. Still, for me it was also important to make a something that I am sincerely proud of. That's why it was probably so difficult.

I, like many other students, underestimated the length of the process and ended up working on my thesis for almost two years. Most of this time I worked full time and did not focus too much on this project that was supposed to be the priority. Writing process is eventually always a process of research with yourself and teaches you what kind of writer, researcher and thinker you are. I found out again, that even though there are some areas that I am not too good with, but as many other things in life they are manageable.

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“War is 90% information.”

– Napoleon Bonaparte, French military and political leader

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LIST OF ABBREVIATIONS

B2B – Business to Business

B2C – Business to Consumer

CDG – Customer data governance

CK – Customer knowledge

CKM – Customer knowledge management

CRM – Customer relationship management

KM – Knowledge management

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1. INTRODUCTION

This introductory chapter provides insight to the area of the research along with the gaps in current academic literature which have been selected as the subject of this study. The covered and excluded topics are presented and in addition to the research questions and structure of the thesis.

1.1. Research background

Increasing amount of businesses operating in business-to-consumer markets are aiming for customer-centricity and data-driven business models to answer challenges of digitalization and market disruption. In crossroads of these two goals, researchers have argued that unlocking the understanding of customer needs and mindsets can be not only a source of customer-centricity but also lead to competitive advantage (Garcia-Murillo and Annabi, 2002; Gibbert, Leibold and Probst 2002). In academic literature this area of management is discussed under the term customer knowledge management, which focuses on management knowledge about, from and for customers (Gebert, Geib, Kolbe and Brenner 2003). Customer knowledge management can help companies in leveraging their unique customer knowledge to improve customer performance and enhance product and service quality (Khosravi, Hussin and Nilashi 2018, Salojärvi, Saarenketo and Puumalainen 2013).

With exponentially growing amount of data and available technology, customer knowledge has the possibility to guide managers in strategic decisions and can therefore be considered as a strategic asset for a company. Knowledge can create value through three mechanisms; 1) by using the knowledge for greater transactions, 2) by using the knowledge to reduce costs or 3) by selling the knowledge to other companies (Glazer 1991). Some companies have already succeeded in integrating customer knowledge as a part of their strategic and operative business. One of the great examples on this area is streaming service Netflix, that has been able to predict their customer behavior so that their original series success rate is 80% compared to traditional 30-40% success rate on the industry (CIO 2017). Another is webstore giant Amazon, where 35 per cent of consumer purchases come from product recommendations based on customer data algorithms. (McKinsey 2019) Customer knowledge has also been turned into a source of income in platform businesses like Google and Facebook, that use their customer knowledge for add targeting (Google 2019, Facebook 2019).

Even though the importance of knowledge as a strategic asset is recognized by managers and in academy, management of knowledge and data, especially customer related kind, is a stumbling block for most firms (Salojärvi, Sainio and Tarkiainen 2010). Similar trend can be seen in Harvard Business Review's survey for 500 global companies, in which 99% of the respondents said that the aim to be data-driven, but only 30% think they have succeeded in managing their data (Davenport and Bean 2018). Despite technological capabilities that have solved the issue of acquiring and storing vast amounts of data, most companies have not been able to keep up and develop skills to manage, analyze and apply it for business purposes (Davenport and Harris 2007). As quality management is one of the key components in data management, organizations are in a risk of basing their decisions on poor data (Watts et al. 2009).

These issues in practice communicate that customer knowledge management remains as a relevant topic of study. There is a need to understand if nurtured customer knowledge can be a strategic asset in B2C markets as it is claimed by academy. Also, deeper understanding of the successful customer knowledge management organizations compared to less successful ones is needed, so that managers aiming for customer-centricity and data-drivenness can take essential actions. Therefore, this study seeks to understand how customer knowledge management can create competitive advantage to companies operating in B2C markets.

1.2. Literature review and research gaps

Customer knowledge is a relatively new, but increasingly researched concept by several authors (e.g. Campbell 2003, Garcia-Murillo and Annabi 2002, Gebert et al. 2003, Gibbert et al. 2002, Salomann et al. 2005, Salojärvi et al. 2013, Khosravi et al. 2018). Unlike the before popular focus on market knowledge that considered customers as one holistic group (Li & Calantone 1998), customer knowledge considers customers as individuals. Customer knowledge management was born from need to understand synergies of knowledge management and customer relationship management (Rowley 2004) and it has adapted concepts and frameworks from both areas of research. Where customer relationship management focuses on the processes of building, developing and maintaining profitable customer relationships (Grönroos 2007), knowledge management has a focus on exploitation and development of company's knowledge assets (Rowley 2004), which in the context of customer knowledge, generate from customer relationship management processes. As customer

relationship management needs customer knowledge to reach its goal in creating stable and loyal customer base (Rollins and Halinen 2005), customer knowledge management aims on creating value for the organizational by managing processes of customer knowledge (Gupta and Lalatendu 2000).

Academic literature categorizes customer knowledge to three different types; knowledge about customers, knowledge from customers and knowledge for customers (Gebert et al. 2002) and recognizes it can be either explicit (easily codable and shared) or tacit (difficult to code and share). Knowledge about customer is mainly considered as the explicit knowledge stored in IT systems (Rollins and Halinen 2005) and has been a focus of studies on customer relationship management technologies (Khodarakami and Chan 2014, Xu and Walton 2005). One branch of customer knowledge management studies (e.g. García-Murillo & Annabi 2002, Gibbert et al. 2002, Rowley 2002, Gebert et al. 2003) focus mainly on tacit knowledge from customer about products, suppliers and markets. These researchers consider customer knowledge management as co-operation with customers that lead to innovation and product quality. Similar approach has taken by Daghfous, Belkhodja and Ahmad (2018) and Daghfous, Ashill and Michel (2012) in studies that research knowledge for customer as a tool to support customers innovativeness.

The benefits of customer knowledge management have been often studied through general framework of knowledge management that falls to three dimensions; enablers, processes and outcomes (Lin 2007). Khosravi et al. (2018) visualized this framework to suit the context of customer knowledge (Figure 1). In the framework customer knowledge management enablers are divided to human, technical and organizational kinds, which support knowledge processes and lead to outcomes like competitive advantage and organizational performance (Lin 2007). This kind approach has been taken in studies eg. by Salojärvi et al. (2013) and Khosravi and Hussin (2016). Identified customer knowledge management enablers include customer-oriented culture (Gibbert et al. 2002), collaboration of teams (Garrido-Moreno, Lockett and García-Morales 2014), customer relationship management technologies (Wu, Guo and Shi 2013), top management support (Salojärvi et al. 2013), rewards (Campbell 2003) and individual competencies (Zhongke & Lixin 2010). Enablers have supported studies on customer knowledge management effects on outcomes like competitive advantage (Aghamirian, Dorri and Aghamirian 2015) financial and operational performance (Tseng 2016, Salojärvi and Sainio 2010), innovation (Fidel et al. 2015a, Fidel et al. 2015b) and product

quality (Khosravi et al. 2018). In Figure 1 visualizes the general framework of customer knowledge management.

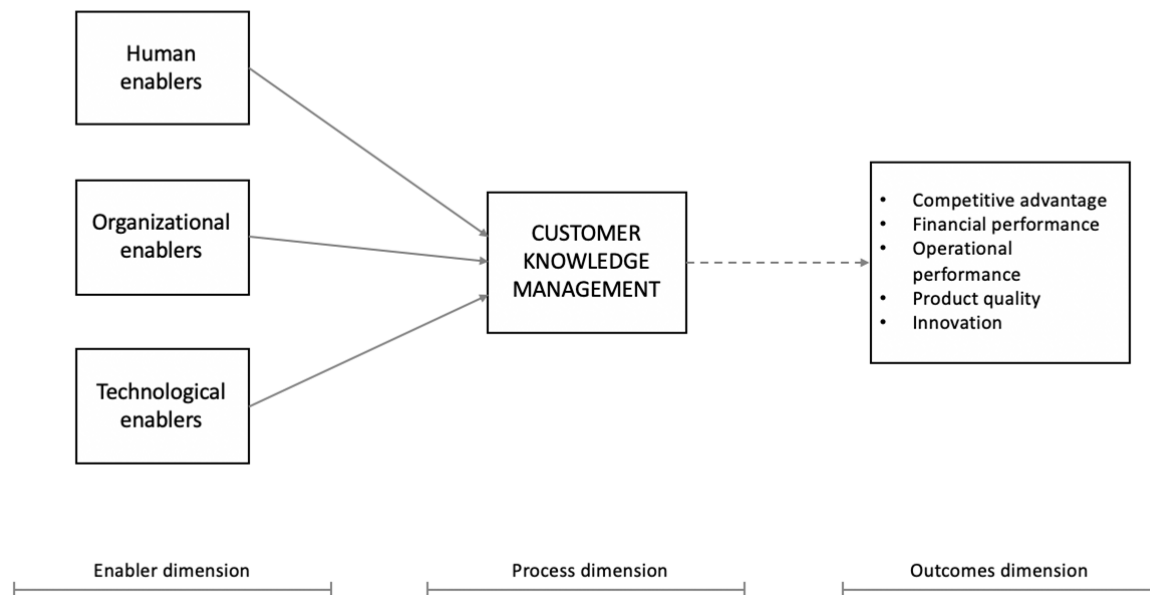


Figure 1. General customer knowledge management framework based on Lin (2007) and Khosravi et al. (2018)

Contents of the process dimension vary greatly between different authors. One common categorization is that customer knowledge creation happens through knowledge acquisition, knowledge dissemination and usage of knowledge (Darroch 2003, Salojärvi and Sainio 2010). Khosravi et al. (2018) use process of acquisition, storage, sharing and application. Garcia-Murillo and Annabi (2002) discuss customer knowledge revealing, sorting and leveling. Bose and Sugumaran (2003) present technology-oriented model with 1) knowledge identification and generation, 2) knowledge codification and storage process, 3) knowledge distribution and 4) knowledge utilization and feedback. These processes are not well suited for explicit knowledge hence they do not cover the analytical part of knowledge processing. Rollins and Halinen (2005) and Rowley (2002) take a more traditional knowledge management approach in explaining the transformation of customer data to customer information and then to customer knowledge. This approach will also be taken in this study.

In quantitative customer knowledge management studies, process dimension of customer knowledge management has been usually measured through mentioned process steps. More unified performance measures have been proposed by Zhao, Li and Wang's (2012) balanced scorecard application and Tseng and Fang's (2015) Customer Knowledge Management Performance Index based on knowledge management performance framework by Lin and Lee (2005). Organizations have different ways of interacting with their customers and therefore their sources customer knowledge and needs to use it vary between different industries. Measuring organization's success in customer knowledge management with features or types of knowledge might lead to unreliable outcomes. Therefore, in this study customer knowledge process dimension is measured through its output, customer knowledge quality, where one of the key measures is the usability of knowledge in the organization. Customer knowledge quality will be further discussed in the chapter 2.1.3. Even though the consensus of the included process steps or process measurements has not been reached in the academia, researchers do argue that the ability of the firm to utilize customer-specific knowledge should be recognized as a potential source of competitive advantage (e.g. Campbell, 2003; García-Murillo & Annabi, 2002; Zahay and Peltier 2008).

In addition to fragmented understanding of customer knowledge management processes, literature lacks separated characteristics of customer knowledge in business-to-business (B2B) from business-to-consumer (B2C) markets. B2B markets differ from B2C markets significantly as they are more complex, they have more diversity in demand, they usually have fewer customers who buy larger volumes and they have longer relationships with their supplying firms (Kotler 2006, 21-30). On the contrary, B2C markets are less complex, have less diversity in demand and have more and shorter customer relationships. In B2B markets tacit customer knowledge has naturally a high value since account managers often hold great amount of the customer-specific knowledge (Vafeas 2015). In B2C markets, it is almost impossible to for salesperson or marketer to know customers individually and therefore customer relationship management has rapidly advanced with the arrival of CRM technologies (Campbell 2003).

This study aims to fill gaps in customer knowledge management research by clarifying the characteristics of customer knowledge, customer knowledge quality measures and customer knowledge management enablers in B2C organizations. Clarified concept of B2C customer

knowledge management will be used in empirical research to gain deeper understanding how customer knowledge management can serve as source of competitive advantage. The target of this study is to give managers operating in B2C markets more clarified view on how they should approach customer knowledge management and which enablers are necessary to implement and develop high quality customer knowledge management practices that can create strategic value.

1.3. Research questions

As the focus of this study is in understanding if and how customer knowledge can serve as a source of competitive advantage for business operating in B2C markets. This will be reached by combining theoretical and empirical methods. To guide the research process, this study's first and main research question is formed to be following:

RQ1. How can customer knowledge management create competitive advantage in B2C business?

Most organizations do perform customer knowledge related actions, but not all have successful outcomes from their CKM efforts (Salojärvi, Sainio and Tarkiainen 2010). This indicates that customer knowledge management executions can vary in effectivity and managing customer knowledge in some level is not enough to create competitive advantage. The characteristics of good customer knowledge management needs to be defined, so that the quality of customer knowledge management can be measured with statistic methods. Therefore, the first sub-research question takes the following form:

SRQ1. What are the characteristics of good customer knowledge management in B2C business?

Effective knowledge management processes are supported by facilitating mechanisms in the organization (Lin 2007). To understand how some organizations are better in customer knowledge management than others, human, technological and organizational enablers that enhance the quality of customer knowledge need to be defined. These enablers will be raised from current customer

knowledge management literature in addition to other relevant research fields that discuss the management of customer related knowledge. The second sub-research question is therefore:

*SRQ2. What are the enablers of
good customer knowledge management in B2C business?*

To clarify the causal relations from customer knowledge management enablers to outcome of competitive advantage empirical research conducted among marketing and sales professionals. The results of empirical survey support the main research question and answer to the third sub-research question:

*SRQ3. Which enablers of customer knowledge management
enhance customer knowledge quality and indirectly competitive advantage in B2C business?*

By answering these research questions, the topic of customer knowledge management in B2C context are is thoroughly discussed and suggestions for managerial inputs can be made. As these questions serve as the guideline for the study, theory and empirical research are built to follow them. This will be presented more thoroughly in the chapter 1.5. Structure of the study.

1.4. Exclusions and limitations

Customer knowledge management has already gained great interest in B2B context (e.g. Salojärvi et al. 2013) or has covered both B2B and B2C markets (eg. Gibbert et al. 2002). This study focuses only on companies with consumer clients and therefore results are not necessarily applicable for businesses operating in B2B markets. As companies in B2C industries with large customer bases are unable to create personal relationships with all their customers, explicit knowledge about each individual customer becomes essential for customer relationship management (see Chapter 1.2.). Therefore, this study focuses on the management of explicit customer knowledge that can be shared in the organization rather than tacit customer knowledge held by account managers and customer service professionals or customers themselves. Some of the previous research has been conducted from the point of view where customer knowledge is stated to be only the tacit knowledge created in everyday customer interactions (Wang 2015, Choi and Lee 2002). Tacit customer knowledge has already

discussed as a source of innovation for example by Falasca et al. (2017) and Gibbert et al. (2002). Because of the complexity of modern organizations, standardized information sharing is needed (Zack 1999, Day 2000) and management of explicit knowledge becomes highly important also in the customer knowledge management context. In the scope of this study, tacit knowledge is seen first and foremost as a source of explicit knowledge. Also, as explicit knowledge is more dependent on firm's IT systems, technological enablers are expanded from customer relationship management technologies to cover issues of data management.

Customer knowledge research has not yet a complete view on customer knowledge management process and the defining of them is out of the scope of this study. As the research methodology is chosen to be quantitative over qualitative, the measurement of successful customer knowledge management outputs seemed more essential for comparable results. In this study, the output of customer knowledge management is defined to be high quality customer knowledge which will be created from well management customer knowledge creation processes. Selected research methodology impacts also the results – it is not likely that totally new enablers will emerge as existing ones are tested with statistic methods. This research will however give better understanding of different human, organizational and technological factors on customer knowledge management quality and its relevance to competitive advantage by testing their significances in B2C markets.

Empirical research is conducted among B2C business operating in Finnish market and are therefore affected by European Union legislation including the General Data Protection Regulation (European Commission 2020). Even though this study does involve discussions of management of consumer data, legal matters considering consumer privacy are not discussed in this study. Also, other factors external to the organization are not in the scope of the study.

1.5. Structure of the study

The contents of this study are divided to theoretical and empirical parts presented in Figure 2. Theoretical part begins with introduction chapter, in which research topic, questions and scope are justified in the light of existing literature and its findings. Then, theory chapter presents relevant concepts for this research in three sections that cover generic customer knowledge management framework presented in literature review (Figure 1). First, customer knowledge management

characteristics are defined for the context of B2C markets by discussing customer knowledge types, customer knowledge creation and customer knowledge quality in B2C organizations. Secondly, significant customer knowledge management enablers are presented based on their relevance in literature and the focus of the study. Thirdly, competitive advantage as a customer knowledge management outcome is discussed.

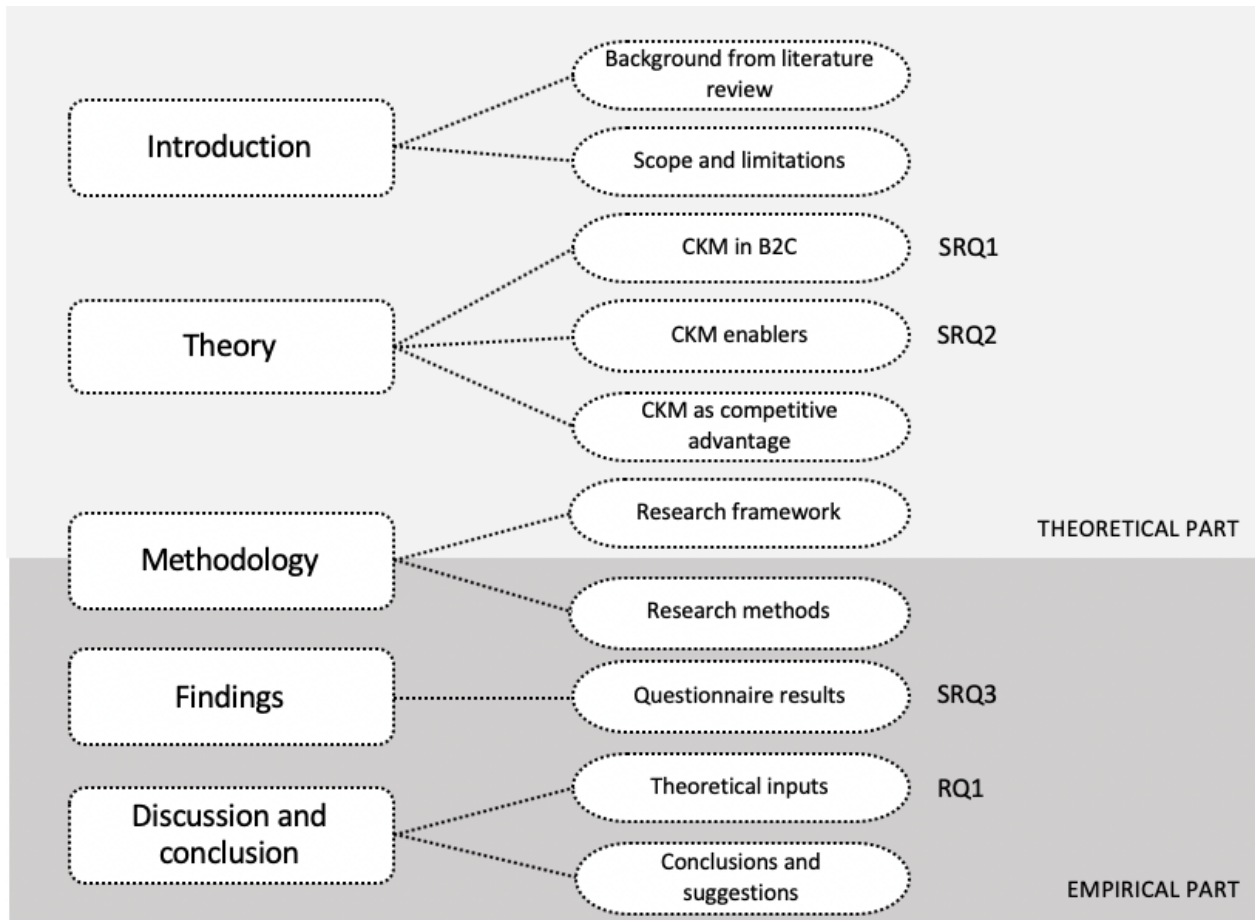


Figure 2. Structure of the study

Hypothesis of the study are raised from the literature and further on developed to survey questionnaire used in empirical research. Before moving to the empirical part, theoretical findings a summarized to a research framework. This section clarifies how literature findings are fitted to selected customer knowledge management framework and described how it serves as a base for empirical study. With current literature of customer knowledge and data management approaches, sub-research questions 2.1 and 2.2. are partly answered and further discussed in the final chapters. The empirical part opens

with explanation of practical research methodology. This section presents how the theoretical methods were applied for empirical data collection and clarifies the procedures and context of the conducted study. Then research findings are presented with description of data analysis to answer the sub-research question 2.3. This will be followed by discussion of research results in the light of theoretical inputs to answer the main research question. Lastly, conclusions and summary for managerial implementations are presented.

2. CUSTOMER KNOWLEDGE MANAGEMENT IN B2C BUSINESS

To answer the research questions of the thesis, this section reviews the current literature relevant to the issue. Theory is divided to three parts each of which focuses on one sub-research question. First in the chapter 2.1., customer knowledge management characteristics and the measurements of good customer knowledge management are defined in B2C business. Secondly, the chapter 2.2. discusses the enablers of customer knowledge management. Thirdly, chapter 2.3. looks into customer knowledge as a source of competitive advantage.

2.1. Customer knowledge in B2C business

Gebert, Geib, Kolbe and Riempp (2002) define customer knowledge as the blend of value, experience and information required, created and implemented during the interactions between and organization and its customers. According to Motowidlo et al. (1997), this kind of contextual knowledge consists of facts, principles and procedures that guide the organization to act effectively in differing customer interactions and to build up a positive image of the organization for the customer. Therefore, customer knowledge management is not only about understanding your customers but also an ability to perform value creating actions. In this study, customer knowledge management is understood as managing the customer-related knowledge generated and used in customer relationship management activities.

2.1.1. Customer knowledge types

As mentioned in literature review, knowledge can be either explicit or tacit. Explicit knowledge is considered to be the information that can be codified, shared and used in an organization through information technology, systematic education and management of organizational processes (Nonaka and Takeuchi 1995). Explicit information is objective, rational and can be expressed in words and numbers, and since it is fairly easy to identify, store and retrieve (Wellman 2009). In the case of customer knowledge, this is the easily quantified information like contact information, demographic details and contract information, but also the trackable behavior of the customer. Tacit knowledge in the other hand is the highly personal knowledge that is hard to express with language and numbers (Nonaka & Takeuchi 1995). These can include beliefs, points of view, technical skills, and relationships (Ma and Qi 2009). In the case of customer knowledge, for example personal interactions with the customer's or long career with industry experience are likely sources of tacit customer

knowledge. It can also be the personal contacts and ability to sell certain product to certain type of customers.

Explicit and tacit knowledge are not completely separate from each other, since explicit knowledge always grounds from tacit knowledge, but they cannot be developed at the same time (Nonaka and von Krogh 2009). Nonaka and Krogh (2009) explain this with an example of a hammer – one can either master the knowledge of designing the best hammer (tacit knowledge) or being the best at using one (explicit knowledge). Similarly, one can either be the best at performing customer knowledge processes or as the designer of the best possible process. Tacit knowledge is crucial for the latter, but explicit knowledge and its management is the one creating operational difference. The issue with the tacit knowledge is that subjective experiences do not necessarily adapt to bigger context (Pham and Swierzek 2006). Personal relations with clients and colleagues are indeed a key part of customer relationship management for B2B account managers, but in B2C business, in order to personalize customer relations for a big customer base, coded information is necessary.

CKM literature categorizes customer knowledge to three different types; knowledge about customers, knowledge from customers and knowledge for customers (Gebert et al. 2002). Knowledge about customers may include any characteristics of the customers motivations, demographic information, behavior or purchases (Day 2000, Davenport et al. 2001). By managing, combining and analyzing the knowledge about customer, companies are able to understand their customers' demographics and behavior, and segment them to different customer groups (Smith and McKeen 2008). Knowledge from customers, in its turn, is the knowledge that customer has and provides to the company in interactions with the organization. This information is something that company is unable to achieve without communicating with their target groups (Gebert et al. 2002). Finally, knowledge for customers is the information that a company provides for the customer.

Knowledge for customer differentiates between B2B and B2C markets. In B2B markets, customers are also practicing business and often benefit from provided knowledge as it can serve a source of co-innovation and mutual success. In B2C markets, consumers are less likely to innovate on their own, and therefore the knowledge for customer has more informative than innovative nature. This knowledge can be considered also as communication to the customer, including targeted and

personalized marketing campaigns, formal informing, educating materials and instructions. It can also be the data that company provides for the customer for better customer service eg. electricity usage reports or exercise statistics in a smart watch. According to Gebert et al. (2003) knowledge for customer is a core element in the management of customer relationships to satisfy customer’s information needs. In B2C markets, knowledge for customer is not only one-way communication but can also be an important source of behavioral data about the customer’s interests or preferences.

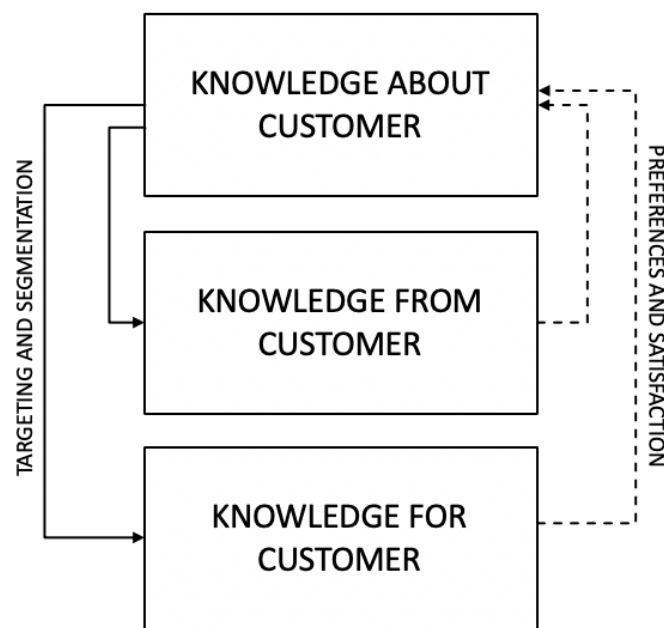


Figure 3. Customer knowledge types based on Gebert et al. (2002)

Figure 3 presents that knowledge from and for customer can also richen the knowledge about customer. Since knowledge about customer usually is the explicit information gathered in IT systems (Rollins and Halinen 2005) and serves as the base of segmentation and targeting methods, the resonance of knowledge for customer, or customer communications, can generate important data about the customers preference products or even the tone of voice they prefer. As the explicit customer knowledge is based on data, it can be assumed that all the interactions with the customer where behavioral data is used and its effectivity is measured, can be a source of explicit knowledge for customer. Knowledge from customer is explicit, if it is collected in a coded form (eg. surveys or

satisfaction score) or codable form (sound or text) that can be turned into information with analytical methods. If this data, for example satisfaction score of the customer, is added to the customer-specific profile, it can richen the knowledge about customer.

Tacit customer knowledge B2C	Explicit customer knowledge B2C
<ul style="list-style-type: none"> • Subjective • Emotional • Experience-based • Hard to communicate • Mainly knowledge from customer • Cannot be coded, stored and shared without high risk of error • Especially crucial for innovation and product/service development 	<ul style="list-style-type: none"> • Objective • Rational • Data-based • Easy to communicate • Mainly knowledge about and for customer • Can be coded, stored and shared in the organization’s IT systems • Especially crucial for customer relationship development

Table 1. Tacit and explicit customer knowledge differences after Polanyi (1966) and Nonaka and Takeushi (1995)

Based on previous, it can be concluded that explicit customer knowledge is based on knowledge about customer and its analysis, and tacit customer knowledge is based on personal experiences with the customers. Also, customer knowledge management in B2C markets can be in explicit or tacit form, first of which is the key source of relevant information for customer relationship management. Tacit customer knowledge can serve as a source of product/service development and innovation also in B2C markets, but it has a greater role for B2B business. These differences of explicit and tacit customer knowledge are summarized in Chart 1.

2.1.2. Customer knowledge creation

Grover and Davenport (2001) pointed out that companies' knowledge management platter is actually often an unintentional mix of knowledge, information and undefined data. It is not uncommon to mix up these terms, hence they are very closely related. Originally knowledge has been defined as the information that has been verified applicable through experience and is in a form that it can be used in well-reasoned decision making and taking actions (Polanyi 1966). In other words, knowledge is something that created in unison of person's cognition and reality (von Krogh 1998). It is also possible that one can know more than they are able to communicate, hence knowledge is not having information but understanding the meaning of it in different contents (Polanyi 1966).

Data, on the other hand, is considered as a set of fact-based observations, ones and zeros, that are not set in a context (Glazer 1991). Data is usually not valuable as it is, and it needs to be modified or visualized into a simpler form. Information, on the other hand, is something that generates when data is processed, organized, placed in a relevant context, and given specific meaning (Glazer 1991). This can be for example charts, figures or numbers. Unlike information that is available but not yet absorbed, knowledge bears from information that has been anchored and interpreted with personal experiences, skills and competences (Simon 1991). Knowledge is something that an organization or individual has, and therefore it is always related to human activities. The flow from data to information to knowledge presented first by Nicolas Henry (1974), is often described in a form of a pyramid, hence knowledge is denser and more specific than data and information. Zeleny (1987) further on described the difference of these four states of understanding as "know-nothing" (data), "know-what" (information), "know-how" (knowledge) and "know-why" (wisdom).

Even though explicit knowledge is the key interested of this study, it is important to understand how it relates with tacit knowledge. According to Nonaka (1994) organizational knowledge creation is a continual dialogue of explicit and tacit knowledge. This dialogue, also called the SECI model, contains four stages; 1) socialization, that describes the sharing of tacit knowledge between individuals, 2) externalization, that describes how tacit knowledge is standardized to explicit knowledge, 3) combination, that describes how merging explicit knowledge sources create new knowledge and 4) internalization, that describes how new explicit knowledge is transformed to tacit knowledge through usage of knowledge and therefore human involvement (Figure 4). For customer

knowledge creation, all four SECI model phases are important. Socialization phase makes the ground for shareable knowledge creation as in this phase individuals learn what customer knowledge is needed in the organization. Externalization phase standardizes the collection and storing processes of customer data. Combination phase merges different sources of customer data together and brings it to context to create customer information. In internalization phase explicit customer knowledge is used in practical customer relations and by reflecting the results, employees generate new tacit knowledge. This tacit knowledge can start new round in the circle and develop the customer knowledge management processes further.

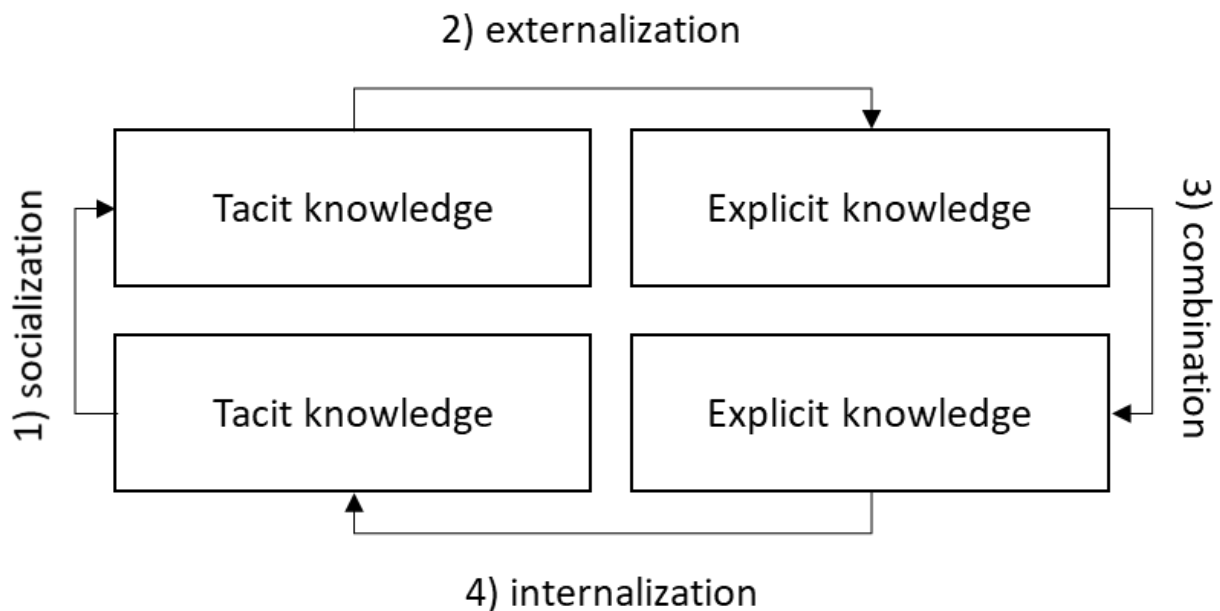


Figure 4. Explicit and tacit knowledge dialogue based on Nonaka (1994)

In the Customer knowledge process (Figure 5), DIK pyramid and SECI model combination and internalization phases are combined to describe the process in more detail. The bottom customer data section is the state of “know-nothing” as data is only ones and zeros without processing and context. In this phase data is stored in a warehouse which can be CRM system, ERP system, or other data depository of the company. From there, customer data is combined with other explicit data and context to create customer information. Now state of “know-what” is reached and customer information is available for usage. By utilizing information in customer interactions its quality, usability and effectiveness can be evaluated. The results of information usage should generate and

enrich the customer data depository. By testing what sort of communications resonate with each type of customers, state of “know-how” is reached. This is when part of the knowledge transforms to tacit customer knowledge stored as experience of the employees executing these CRM activities. This customer knowledge about what works with specific customer, should be stored as a behavioral information in the customer data warehouse as properly as possible. Further on, organizations can move to “know-why” level to seek to understand why the customers are behaving the way they behave to create more tacit customer knowledge to the organization. This also called wisdom stage is one step further from explicit customer knowledge but does generate benefits for it as this deeper understanding helps in designing of data collection methods as well as overall ways of communication.

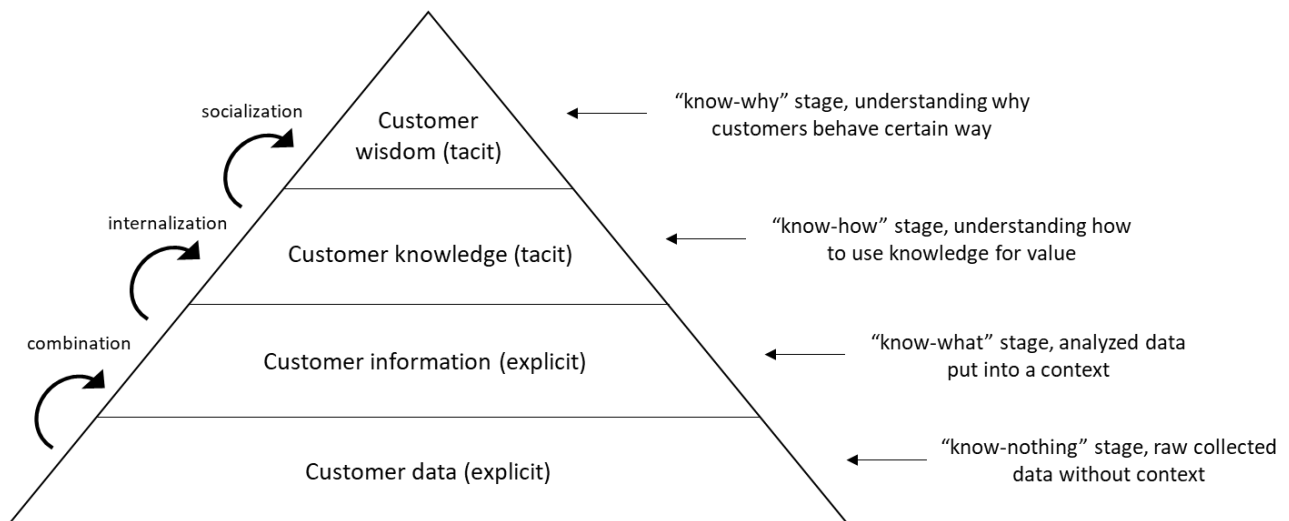


Figure 5. Customer knowledge process based on Henry (1974), Zeleny (1987) and Nonaka (1994)

In this study, explicit customer knowledge is considered to base on customer data that can be turned into information, which can be in turn shared within an organization to support and modify the current customer knowledge (Campbell 2003, Cohen and Levinthal 1990, Jayachandran, Hewett and Kaufman 2004). For the design of this explicit knowledge flow, tacit customer knowledge is needed to understand what data is needed to collect and how to design the processes for customer data management, analysis and organization customer information and finally the usage of customer knowledge. High quality customer knowledge is considered as an output of good customer knowledge

management. Certain factors like tools, processes and professional capabilities in different parts of the process can enable the quality of customer knowledge. These enablers are further discussed in the chapter 2.2.

2.1.3. Customer knowledge quality

In a study conducted by Gartner group, 70 % of unsuccessful CRM implementations fail because of bad data quality (Gartner 2019). Even though data's importance as a strategic asset is recognized, studies show that organizations lack in interest and ability to tackle the issue with data and knowledge quality (Marsh 2005). Silvola et al. (2011) argue that the raising data quality problems of modern companies originate from the quick adaptation of information technology systems and their increasing ability to collect vast amount of data; as the possibilities of data usage increase the management of it gets too complex for organizations. As explicit customer knowledge is based on data, customer knowledge quality grounds from the quality of customer data (see chapter 2.1.2. Customer knowledge creation). For the purposes to measure customer knowledge quality in an organization, factors of data quality (Figure 6) are adapted in this study.

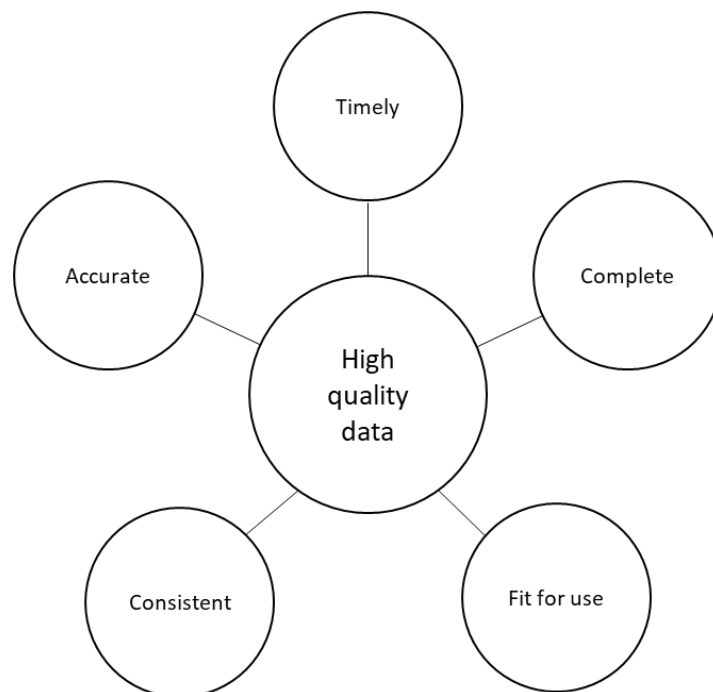


Figure 6. Data quality factors based on Ballou and Tayi (1999)

High quality data is often referred as “fit for use” and defined with four factors; accuracy, timeliness, consistency and completeness of the data (Ballou and Tayi 1999). Accuracy refers to the correctness and reliability of the data, meaning that the data contains minimum amount of errors (Ballou and Tayi 1999). Timeliness refers to the age of data, as data should be relevant for the data user (Wang and Strong 1996). Consistency, on its turn, refers to similar format of collected data, so that it can be easily matched with other sources (Ballou and Pazer 1995). It also points to the continuity of the data gathering. Finally, completeness refers to having all the relevant information collected (Ballou and Tayi 1999). According to Zahay et al. (2004) high quality customer data includes customer touchpoints (i.e. internet contacts, email, telephone), transaction data (i.e. purchase history, credit history, payment history), loyalty data (i.e. loyalty programs, satisfaction surveys) and customer lifetime value data (i.e. retention, share-of-wallet). Hwang, Lin and Shin (2018) summarized customer data quality as “information collected across multiple transactions, touchpoints, and channels accurately reflects the behavior and sentiments of customers, both collectively and individually.” In other words, data quality indicates how well enterprise data matches the situations in real life (Wang and Strong 1996).

Data quality issues can raise from poor data entry, including misspellings, typing errors, empty data fields and variations of spelling and naming. These are often the result of lacking data standards, multiple databases and old “legacy” systems containing poorly documented data. (Reid and Catteral 2005) Customer data quality is essentially important since customer communications and its effectiveness heavily lay on the accuracy of targeted audience (Zahay 2014). Also, in order to make successful decisions companies need to be able to trust their data (Madnick et al. 2004). In line with this, Peltier, Zahay and Lehmann (2013) found out in their study that data quality significantly affects both customer performance and business performance. As is B2C markets the most relevant knowledge bases from customer data, quality of this knowledge can be seen as a result of well executed customer knowledge management. For these reasons, it is argued that customer knowledge management loses its strategic advantage if its outcome, customer knowledge, is not high quality.

2.2. Customer knowledge management enablers

Customer knowledge management enablers have been recognized by several authors (Gebert et al. 2003, Salojärvi et al. 2010, Rollins and Halinen 2005, Khosravi et al. 2018). In 2016, Khosravi and Hussin (2018) conducted a review study of customer knowledge management enablers and categorized the most common to organizational, human and technical enablers. This categorization originally presented by Lin (2007) will also be used in this study to discuss different enablers most relevant in the context of B2C markets. Enablers were selected for discussion from Khosravi and Hussin's (2018) review and supported with more technical approaches from data management literature. Only organization's internal factors were selected to keep the study in scope. Also, enablers that discuss customer knowledge management as a source of innovation were left out. Some enablers, like customer knowledge management strategy and top management support were grouped together hence the relativity of the terms.

2.2.1. Organizational enablers

Organizational enablers have been the most studied facilitator factors in customer knowledge management research (Khosravi and Hussin 2018). Studied enablers have included culture, collaboration, strategy, knowledge-oriented business processes, community of practice, key customer support, program champion, reward system, senior management support, training and customer involvement (Khosravi and Hussin 2018). For this study, most interesting ones have selected to be customer knowledge strategy, knowledge-oriented processes and supportive culture.

Customer knowledge strategy

The first and most crucial step in customer knowledge management implementation is strategy development (Khosravi and Hussin 2018, Buchnowska 2011). If inclusive strategy is lacking, reaching the goals of data-drivenness and customer-centricity might be very challenging (Khosravi and Hussin 2018). Clear strategy has been stated to be a key success factor also in technology implementations dealing with customer knowledge (Roberts et al. 2005). As customer knowledge

management implementation seems to be difficult for organizations (Salojärvi et al. 2010, Salomann et al. 2005), specified strategy might facilitate it as a guideline and reminder of demanded outcomes. According to Rumert (2012), a good strategy includes three aspects: 1) awareness of the challenge, 2) guidance policy for dealing with the challenge and 3) action plan for tackling the challenge. In other words, for successful strategy implementation, top management needs to first recognize the value of customer knowledge and have a good understanding of its current situation. Secondly, objectives and values are set to guide the needed changes in customer knowledge processes. Finally, an action plan to reach these goals should be made. Zack (1999) takes a similar approach in his knowledge strategy framework, in which he presents that strategy is about closing gaps between what the firm can do and what it must or wants to do. In order to achieve the goals, organization needs to create new knowledge about how to get there. These relations are presented in Figure 7, where “what firm must do” practices lead to “what firm must know” practices and further on to develop the capabilities of “what firm knows” and “what firm can do” (Zack 1999). Therefore, closing a strategic gap also involves closing the knowledge gap.

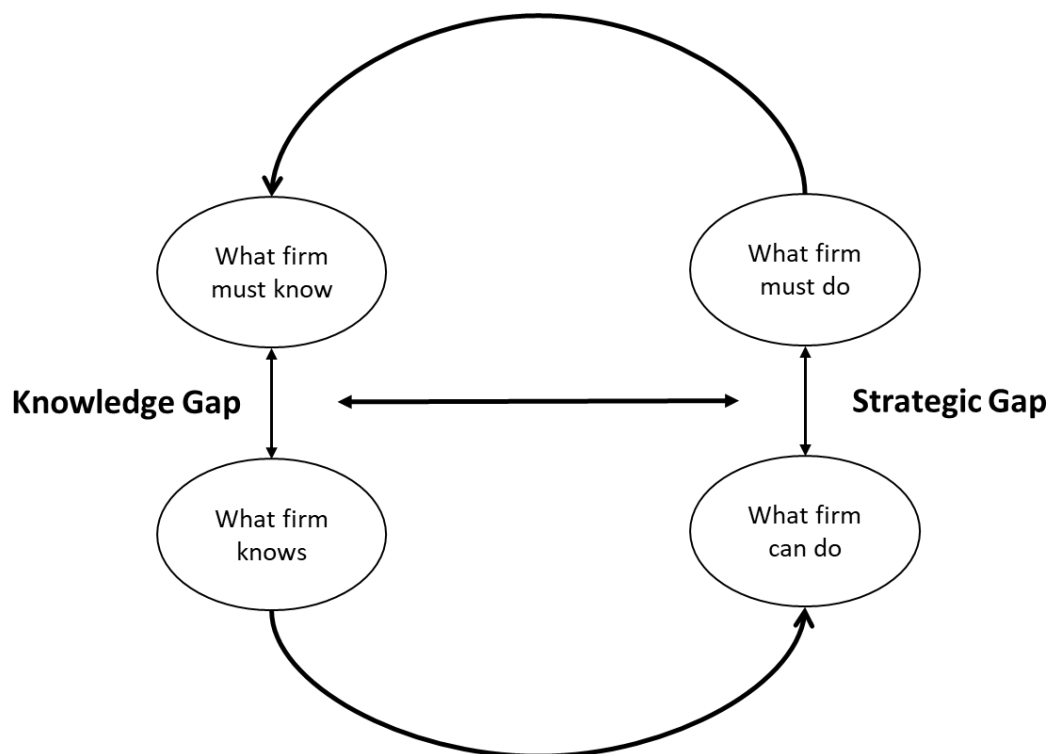


Figure 7. Knowledge strategy framework by Zack (1999)

Strategy has multiple facilitating effects on process performance. With a clear strategic objectives and guidelines, top management gives the organization justification to perform effective customer knowledge management actions. The support from top management has been also found to have positive effects on customer knowledge management success (Salojärvi et al. 2010, Rollins and Halinen 2005). Based on previous, the second hypothesis of the study is following:

H1. Customer knowledge strategy has a positive effect on customer knowledge quality

Knowledge-oriented business processes

Business processes are recognized to be an enabling factors of customer knowledge both in customer knowledge management literature and data management literature (Khosravi and Hussen 2018, Silvola et al. 2011). Business processes can be considered as horizontal activities that transform input (request or need) to an output (result or solution) (Palmberg 2009). Knowledge-orientation of business processes does not mean that process should be defined by organization's technological capabilities but that processes should be designed with consideration to knowledge creation and usage. In line with this, Ofner et al. (2012) suggest data quality aspect should be integrated to existing business processes rather than creating new processes for data generation. Data quality perspective is significant as otherwise departments and teams tend to modify the processes as well as data creation, usage and manipulation for their own needs (Ofner et al. 2013). As customer knowledge mainly generates from multiple customer relationship processes within the company, the design of these processes can have a significant effect on the accuracy, timeliness, consistency, completeness and usability of customer knowledge.

In general, business processes can be considered good if they effectively serve the strategic goals of an organization. Good business processes also include process specific goals and key performance indicators (KPIs), that measure the achievement of those goals (van der Aalst et al. 2016). According to Schmiedel et al. (2013) business processes need to be managed from two approaches; managing the right processes or managing the processes right. According to DeToro and McCabe (1997)

organization should first map the core business processes and sub-processes of the organization and then select a project owner who will be responsible for the improving the processes in line with strategic goals. Academic literature has introduced several tools for efficient business process management including for example total quality management (Deming 1986), business process re-engineering (Hammer and Champy 1994) and Six Sigma (Klefsjö, Wiklund and Edgeman 2001).

Despite the tools available, Salomann et al. (2005) found in their study that 60% of the respondents did not have a systematic customer knowledge management processes in their organization. Also, it is not uncommon that processes and their owners are not specified in the organization even though it is a high risk for data quality (Silvola et al. 2011). It is likely that these issues arise from the complicated nature of customer knowledge; it is dynamic, quickly outdated and might have a contextual meaning (Rollins, Bellenger and Johnston 2012, Davenport and Klahr 1998). Organizations also tend to be better at collecting information than using it in practice (Campbell 2003). This indicates that processes for information collection are inconsistent and they are not designed for knowledge usage. Therefore, the processes of collecting, analyzing and using customer knowledge should be integrated to employee's everyday work so that knowledge supports and facilitates tasks rather than complicating them. The third hypothesis of the study is:

H2. Knowledge-oriented business processes have a positive effect on customer knowledge quality

Supportive culture

Culture is the third organizational factor which importance keeps repeating in customer knowledge management literature (Khosravi and Hussen 2018, Day 2000, Salojärvi et al. 2010). It is also considered as a critical factor in traditional knowledge management literature (Chang and Lin 2015). According to Hofstede (2005) culture is the “collective programming of the mind”. It consists of shared assumptions that a group holds, and which guide the accepted patterns of behavior (Schein 2004). As it affects behavior and attitude of individuals, culture can be either a major barrier or a success factor for knowledge management process (Ajmal and Koskinen 2008, Chang and Lin 2015). This can be seen also in customer knowledge processes as customer relationship management technology implementations which success depend on supportive culture (Kim and Kim 2009).

According to Schmiedel et al. (2013) four values of organizational culture effect the success of business process management. These are attitude towards customers, orientation to excellence, commitment to processes and attitude towards cross-functional co-operation. Customer-orientation has been found to affect information reciprocity, capture, integration, access, and use (Jayachandran et al. 2005). Co-operation and teamwork have also been recognized as separate enablers (Khusravi and Hussien 2018). For customer knowledge quality, commitment to processes is especially crucial, as data quality issues often raise from poor data entry or adjusted processes (Raid and Catteral 2005, Silvola et al. 2011). Successful customer knowledge management requires a common target for customer-orientation and excellence as well as shared understanding of the importance high quality customer knowledge. As customer knowledge is generated from sales, marketing and service processes (Gebert et al. 2003), it is important that the culture supports commitment to defined processes and co-operation of teams.

Organizational culture is a key element in creating value from knowledge assets (Ajmal and Koskinen 2008). As the whole organization needs to be committed in order to implement successful knowledge management processes (Gupta and Lalatendu 2000), the culture and individual values should in line with strategic goals. To facilitate the acceptance of new customer knowledge management approach, benefits and causes of customer knowledge quality should be well communicates across the organization. Based on previous, culture can therefore be considered as an enabler for successful customer knowledge management and high-quality customer knowledge. The fourth hypothesis of the study is:

H3. Supportive culture has a positive effect on customer knowledge quality

2.2.2. Technical enablers

Technical enablers have mainly been studied from the customer relationship management point of view. CRM technology has been found to be a significant enabler in customer knowledge creation (Khodakarami and Chan 2014). As this study has a key interested in customer knowledge that is based on data and not all customer data is stored in CRM systems, data management approaches of customer

knowledge integration and customer knowledge governance are brought to get wider understanding of technical enablers.

CRM technologies

Customer relationship management technologies refer to IT systems designed for customer relationship management. CRM technologies have been divided to operational, analytical and collaborative systems to clarify their functionalities (Gebert et al. 2003, Rollins and Halinen 2005, Xu and Walton 2005). In this categorization, operational CRM systems are greatly focused on business process facilitation and can cover for example automation of salesforce or customer service tasks (Gebert et al. 2003). Collaborative CRM systems synchronize and share the information of the customer in multiple channels to one place or might serve as a platform for vendors or customers to operate together (Rollins and Halinen 2005). Analytical CRM systems in turn manage and analyze the customer data and create important reports for management. (Gebert et al. 2003)

As customer-related knowledge stored in IT systems is mainly explicit, CRM has a great role in customer knowledge processing in B2C markets. CRM systems are, in their essence, customer data repositories for customer-specific data that combines relevant information about the customer for sales, marketing and customer service. By storing customer specific history, contact and preference data, firms to are able to customize their services for individual customers and engage with them in a meaningful dialogue (Campbell 2003). Studies support that the implementation of CRM system has a positive effect on company's marketing and business performance (Kim & Kim 2009, Zahay & Peltier 2008). CRM technology is indeed the backbone of the customer information processing but its execution impacts also non-technological factors as customer service and communications, customer behavior and even financial success (Josiassen, Assaf and Cvelbar 2014). The fifth hypothesis of the research is:

H4. CRM technology enhances customer knowledge quality

Customer knowledge integration

In order to CRM system to provide significant advantage for the organization, it should provide users and managers easy, quick and complete access to customer specific data (Bose 2002). This is not the case in practice, since customer knowledge is usually scattered to multiple systems and companies struggle to combine the information to complete and consistent customer profiles (Davenport, Harris and Kohli 2001). Integrated customer view, also known as customer 360 view, collects all information about the same customer under the same customer profile (Figure 8), and should be the method of organizing data storage both in CRM system or data warehouse (Bose 2002). Compared to traditional fragmented customer view, integrated view reduces the manual work of knowledge search (Bose 2002). It also gives greater understanding of the customer with ability to richen the customer profile with additional types of data like transactional data, psycho-demographics, customer touchpoint data and personalization data (Zahay et al. 2012).

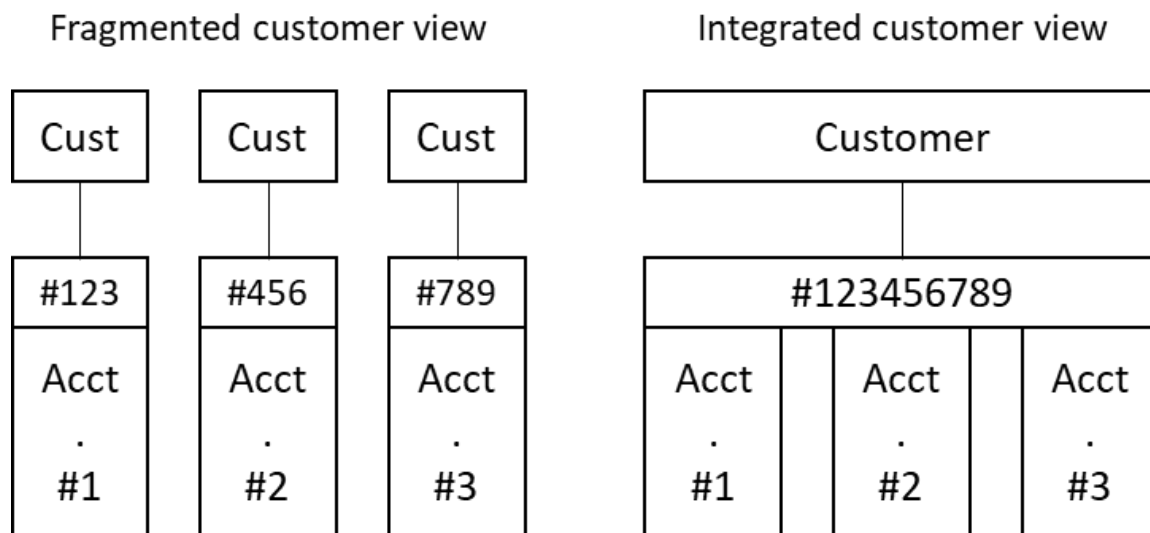


Figure 8. Fragmented vs. integrated view of customer view based on Bose (2002)

To support customer knowledge management, CRM software should not be seen only as an operational tool, but to be developed as a part of the whole IT architecture and organizational data strategy (Stefanou, Sarmaniotis and Stafyla 2003). By centralizing customer information to one place, knowledge quality in terms of usability, completeness, consistency, timeliness and accuracy can be

managed more efficiently. As the access to the information is easier, it encourages for the usage of information which generates knowledge about effectivity and helps in the development of customer knowledge management processes. Therefore, the sixth hypothesis of the study is:

H5. Customer knowledge integration enhances customer knowledge quality

Customer data governance

The management of customer data is a complex task and needs the input and engagement of all data users of the organization. As organizations often struggle with implementation of data-orientation and customer knowledge management processes (Davenport and Bean 2018, Saloman et al. 2005), better adaptation of systematic data governance practices might serve as a solution. Literature has presented customer knowledge mapping as a potential enabler of customer knowledge management (Khosravi et al. 2018), which can be seen as a first stage of customer data governance. Customer knowledge map refers to holistic understanding where in the organization customer knowledge is created and how it flows through the organization (Khosravi et al. 2018). It usually presents the sources, flows, constrains and terminations of knowledge within an organization and helps to understand the relationships and roles of different knowledge databases (Kim, Suh and Hwang 2003). In order to create a knowledge map, all types and sources of knowledge need to be listed in detail including the information and where the knowledge is found and who is responsible for it (Davenport and Prusak 1998).

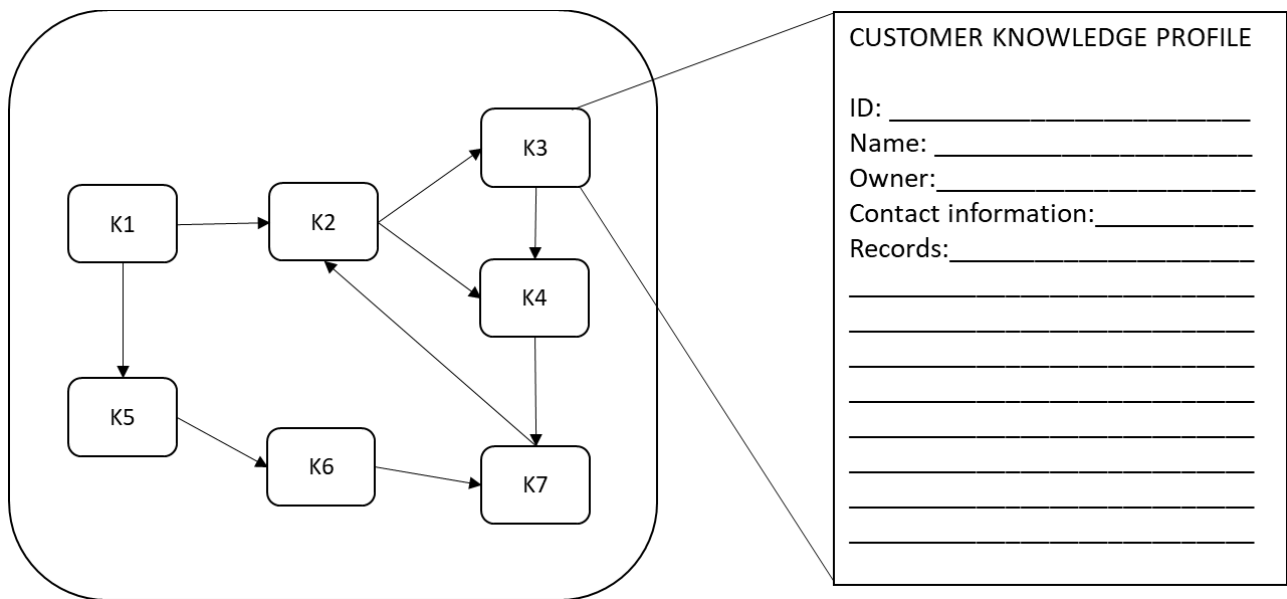


Figure 9. Example of organizations knowledge map

In addition to knowledge mapping, data governance includes design and management organizations data architecture and roles of different data including master and meta data management. Smith and McKeen (2008) argue that poor data governance leads first to data silos and differing data management practices between the organization’s units or locations. Eventually this creates information silos on top of which a new ERP or CRM solution might make the situation even more complex (Silvola et al. 2010). One goal of master data management implementation is to break down these data silos and unify the data management processes between business units (Vilminko-Heikkinen and Pekkola 2017). Therefore, data governance has a common interest with the arrangement part of customer knowledge management process. The seventh hypothesis of the study is:

H6. Customer data governance enhances customer knowledge quality

2.2.3. Human enablers

In addition to organizational and technical enablers, academics recognize human factors that can enable customer knowledge management. These include skills, experience, motivation, values and beliefs of an individual (Attafar et al. 2013, Nagati and Rebolledo 2012, Al-Shammari and Global 2009). Positive correlation between individual competences and successful customer knowledge management have been found in previous studies (eg. Khosravi et al. 2018, Attafar et al. 2013, Wu et al 2013). In line with explicit customer knowledge creation process, the competences to execute each state of the process are likely to affect the quality of customer knowledge management results. These are competence in managing customer data, competence in transferring customer data to information with context and analysis and competence in creating customer knowledge by using the customer information for valuable actions.

Competence in data governance

Data governance is still new concept for organizations. This can be seen in interviews conducted by Silvola et al. (2011), where employees in charge of data management issues, had difficulties with basic data management terms. Competence in data management means that organization's employees are able to conduct data governance actions and manage data quality in the organization.

Competence in analytics

It is often that just the collected data with customer-context is not enough to form usable information for customer relationship management tasks. Therefore, analyzing the data first manually and later on automatically will unlock customer knowledge management value. According to Xu and Walton (2005) analytics can help customer relationship management for example by identifying strategically important customers, segmenting customers for personalized service, tracking and modeling customer behavior patterns and finally use the generated information for behavior prediction.

Competence in customer knowledge usage

Organizations gain customer knowledge by using customer information (see Figure 5). As mentioned, customer knowledge management issues are often not in the generating but rather in using of customer knowledge (Campbell 2003). This can be either because the knowledge is not “fit for use” or because organizations lack in competence how to use the knowledge. Therefore, competence in using customer knowledge in customer relationship management can be a source of successful customer knowledge management and high-quality customer knowledge. The seventh hypothesis of the study is:

H7. Organization's competence in customer knowledge management enhances customer knowledge quality

2.3. Customer knowledge as a source of competitive advantage

Grant (1996) has stated knowledge as one of the fundamental strategic resources for a firm. In line with this customer knowledge management authors consider customer knowledge as a potential source of competitive advantage (Garcia-Murillo and Annabi, 2002; Gibbert et al., 2002). The argument behind this conclusion has two approaches; first is the general argument that knowledge is power, and by more and better organized knowledge the power is greater. For example, McAfee and Brynjolfsson (2012) found that companies with data-driven practices, report better performance on objective measures of financial and operational results. The second approach is that customer-centricity leads to better performance and that one can be customer-centric only by knowing their customers. Some, including Lee et al. (2011) have found that customer knowledge indeed has a positive link on organizations' business performance.

Competitive advantage can be considered as a mix of organization's capabilities that generate superior attractiveness among competitors (Aghamirian, Dorri and Aghamirian 2015). Capabilities can be skills, knowledge and behaviors It is generated through continuing process and will lead to higher performance and competitiveness of an organization. However, competitive advantages are easily copied by competitors or outdated in the eyes of customer when they become more common

on the market. Therefore, organizations should seek their competitive advantages in resources and capabilities that are not easily imitable (Volberda et al. 2010). Knowledge is considered to be one of these intangible resources and significant source of competitive advantage. Knowledge-based competitive advantage is sustainable also because organizations with a lot of knowledge are better at learning more (Zack 1999).

Customer knowledge management allows firms to identify and mark the different segments from their customer base and serve these segments with different customer relationship strategies (Taherparvar et al. 2014) and change their business to be more data-driven. Firms that have more and higher quality knowledge about their customers have better ability to identify and serve customer-specific needs and are therefore more likely to perform better on the market (Lee et al. 2011). What is more, it supports organizations in finding their competitive advantage. In this study, customer knowledge management in B2C markets is understood as an ongoing process of acquiring data, arranging it and turning it into information and finally with using information and learning from its effectivity. Well implemented customer knowledge management results in high quality customer knowledge. Based on previous, the final hypothesis for the study is:

H8. Customer knowledge quality has a positive effect on competitive advantage

2.4. Summary of theory part

Customer knowledge management literature discusses the importance of customer knowledge from two rather differing points of view – knowledge created with customer as source of innovation and quality and customer knowledge (or data) as a company’s asset, that needs to be managed to create value with it. First of these points of view is highly focused on tacit customer knowledge and its practical importance highlights in B2B partnerships. Second of these, the approach taken in this study, has great relevance in B2C markets as explicit customer knowledge is essential for efficient and personalized customer relationship management. Managing explicit customer knowledge stored in company’s systems is more technical approach than management of tacit customer knowledge for innovation and product development. Customer knowledge management literature has even been

stated in some categorizations to cover only the “tacit approach” (Gibbert et al. 2002) and that might be the reason why common customer knowledge processes and ways to measure it did not seem sufficient in the scope of this study. Totally new approaches were not created hence customer relationship management, knowledge management and data management studies that were used to support the theory part already discuss explicit customer knowledge management, only with slightly different angles and terms.

As customer knowledge management literature had not yet clarified the characteristics of customer knowledge in B2C markets, this was done in the beginning of the theory part by summarizing the differences of tacit and explicit customer knowledge (see Table 1). Process for explicit customer knowledge management was created based on data, information and knowledge model by Henry (1974) and dialogue of explicit and tacit knowledge by Nonaka (1994) (See Figure 4). High quality customer knowledge was argued to be the result of this process and was defined by traditional characteristics of data quality. Nine potential organizational, technical and human factors that enable customer knowledge quality were identified from literature; 1) customer knowledge strategy, 2) knowledge-oriented business processes, 3) supportive culture, 4) CRM technology, 5) customer knowledge integration, 6) customer data governance and 7) competence in customer knowledge management.

Based on the theory part of this study, it is clear that customer knowledge management differs in B2C and B2B markets, and hence the topic of this study is relevant to research also with empirical methods. This will further on help to understand if the theoretical assumptions will resonate also in real life. The empirical methodology will be presented in more detail in the following two chapters.

3. RESEARCH FRAMEWORK

The framework of this research is adapted from the general customer knowledge management framework presented in the literature review (Figure 1). Based on the theory part of the study, customer knowledge management enablers, customer knowledge management measurements and effects on competitive advantage are merged with general customer knowledge management framework to create the research framework for this study (Figure 10). Enablers are selected based on Khosravi and Hussin’s (2018) review on customer knowledge management enablers and added with approached from data management literature. Differing from previous studies (eg. Khosravi et al. 2018), process dimension, or the “goodness” of customer knowledge management, is not measured through customer knowledge management activities, hence literature has no clear view on its contents. Instead, more reliable approach of customer knowledge management effectivity was selected to be its output, quality of customer knowledge, measured through accuracy, timeliness, consistency, completeness and fitness for use (Ballou and Tayi 1999). Customer knowledge activities and customer knowledge quality as their output is expected to result to competitive advantage.

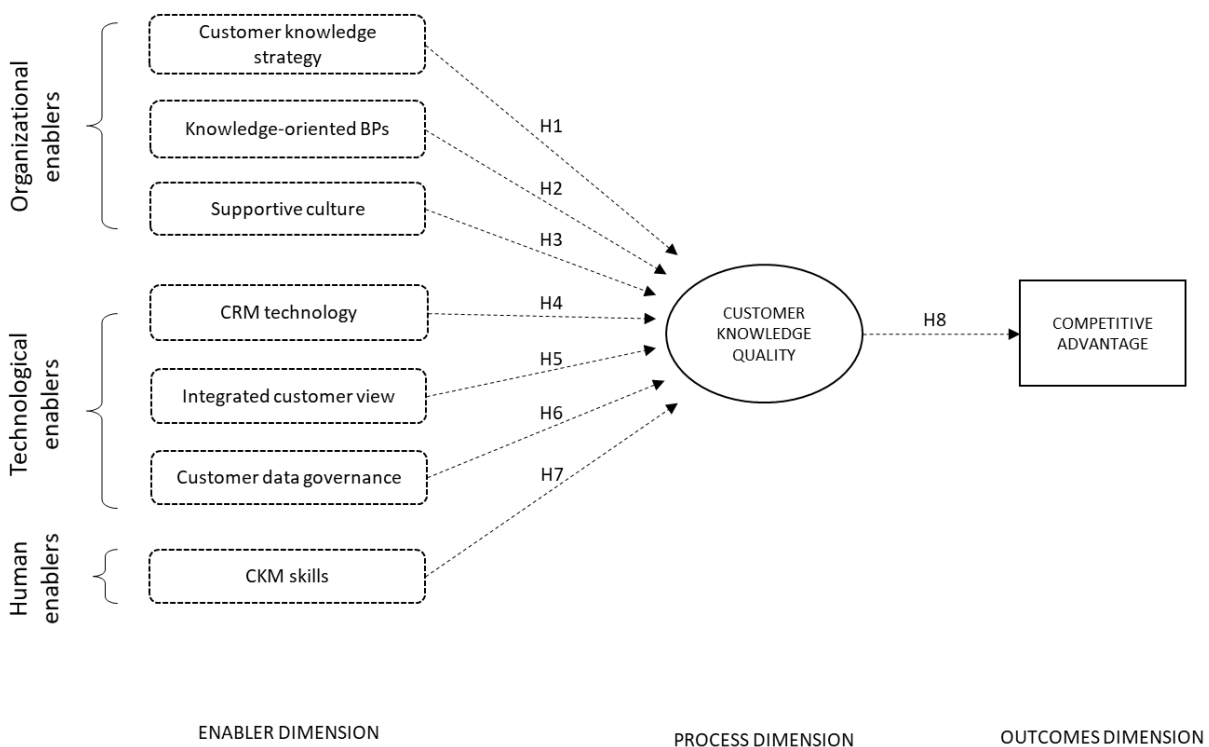


Figure 10. Research framework of the study

4. RESEARCH DESIGN AND METHODS

This research seeks to understand how customer knowledge management can create competitive advantage in B2C markets. To this point, specifics of B2C customer knowledge management, customer knowledge management enablers and customer knowledge relation to competitive advantage have been discussed in the light of existing academic research. Based on these findings, hypothesis and research framework are ready for empirical examination. As presented in the structure of the study (Figure 2), this part of the thesis seeks answer to the third sub-research question;

SRQ3. Which enablers of customer knowledge management enhance customer knowledge quality and competitive advantage in B2C business?

and continues to test the hypothesis of this research. As the nature of this question requires measurement of causalities and their numeric comparison, quantitative analysis with survey data collection was a natural choice for this research.

The purpose of this chapter is to describe and justify the research methodology of this study. First, the research context is presented followed by description of data collection. After this, the data analysis process and used methods are explained. Finally, the reliability and validity of the research is evaluated.

4.1. Research context

Even though customer knowledge management implies to managerial input, it is an overall status of the organization and best understanding of customer knowledge lays in the hands of those who use it on daily basis. Therefore, this research is focused on those professionals who create, analyze and utilize customer knowledge in customer relationship management tasks. Data collection with a survey was essential as needed data was not available from existing sources and qualitative research would not give enough confirmation for the holistic framework. As one of the key differences between B2C and B2B customer knowledge was found to be that explicit knowledge becomes more essential by the growth of company's customer base, survey was targeted to large organizations operating in B2C

markets. Target group was those employees working in sales, marketing and customer service tasks who could evaluate the quality of knowledge, or “fit for use” from their point of view.

In order to test the suitability of the B2C customer knowledge management framework of the study (Figure 10) and answer the third sub-research question, scales to measure the status of competitive advantage, customer knowledge quality and customer knowledge management enablers was needed. Most theoretical terms had been tested by other scholars and scales were able to be adapted from previous studies. The scales of customer knowledge strategy and customer knowledge competence were adapted from the study by Khosravi et al. (2018). Supportive culture was measured with a scale by Schmiedel et al. (2013). A common scale used by Gebert et al. (2003) was used to measure customer relationship technology. Customer knowledge quality was measured with knowledge quality scale by Ballou and Tayi (1999). Competitive advantage was measured with a scale used in a study by Schilke (2014).

In addition to existing measurement scales, three new scales were created based on theory; knowledge-oriented business processes based on studies of Ofner et al. (2012) and Ofner et al (2016), customer knowledge integration modified from knowledge map by Khosravi et al. (2018) and customer data governance based on studies by Khosravi et al. (2018) and Davenport and Prusak (1998). All of the concepts were measured with three-item Likert scales from 1 to 10 except customer knowledge quality that had five items and supportive culture that had four items.

The research was conducted without involvement from third parties, even though it received support from the authors employer and has been inspired by authors current position in IT consultancy. The research aimed to target multiple organization that varied in size and field of business to get good representation of the population. For practical reasons, this research is focused on companies that operate in Finnish market. As only companies operating in B2C markets were targeted, B2B organizations were excluded from the respondents to keep the scope of the study. Possibilities for comparative studies and other research methods are discussed in the conclusions part of the study.

4.2. Data collection methods

The research was conducted as a survey among Finnish marketing and sales professionals working with customer relationship management during autumn 2019. Suitable audience was found from a Finnish online community of marketing professionals with over 13 000 members. Survey was made with questionnaire creation tool Typeform and posted to the community with an introductory text encouraging members working with customer data to join. Questionnaire was kept open for period of two weeks and reminders were sent a couple of times during this time. Data collection was anonymous, but the respondents had an option to provide their email for the summary of the research results.

As presented in previous chapter, the questions were formed based on previous academic research discussed in the theory part. Most measures were based on previously confirmed scales, but as some of the terms, including integrated customer view and customer data governance were new to the area of customer knowledge management, adaptations were made based on empirical findings. Each organizational, technical and human enabler as well as customer knowledge quality and competitive advantage were transformed to 3-5 questions to explain to evaluate their status in answerers organization. Questions were presented in a form of a Likert scale from 1 to 10 where 10 indicated “I strongly agree” and 1 stood for “I strongly disagree“. In addition, control questions including respondents job title, company’s yearly revenue, number of employees, field of operation and company’s involvement in B2B and B2C markets. Job titles were asked as open questions and respondents selected the best suiting option indicating rest of the control variables. In total, the questionnaire had 35 questions with 30 Likert scale variables explaining theoretical terms and 5 control variables. Before sending, the survey was translated from English to Finnish in order to serve the target audience. It was shown to five individuals of the target group to adjust wordings and terms. All questions, except contact details were made mandatory to avoid missing values in data set. Complete list of survey questions and their academic sources can be found in Appendix.

During two weeks’ time of collection, the survey generated in total 81 answers with completion rate of 62 per cent. 73 answers were accepted to be suitable for the data analysis and 8 answers excluded as they indicated to be from organizations operating only in B2B markets. The low interest rate to the questionnaire might have resulted from the long question set and informal request for participation.

Hence the final number of observations lacks the preferred amount of 100 or larger (Hair et al. 1998, 100), the results of data analysis are considered to be only directional and should be confirmed with a sufficient data set. Reliability of the study is further discussed in chapter 4.4.

4.3. Data analysis methods

Quantitative research seeks to explain and predict causal relationships between researched variables. The aim of the methodology is not only to find these causal relationships from collected data but also measure the power of their effect. Quantitative research is actually a great example of the explicit and tacit knowledge dialogue presented in Chapter 2.1.2. Customer knowledge creation, as concepts created with qualitative methodologies can be codified to numeric form tested in wider research settings. Generalization of the findings is one of the advantages of quantitative research, as long as the measurement scales are reliable and valid. In this thesis, causal relationships between customer knowledge management enablers, customer knowledge quality and competitive advantage is studied with scales based on previous academic research.

Linear regression with Exploratory factor analysis was chosen as the methods for the analysis. Regression analysis estimates causalities between chosen dependent and independent variables and aims to measure their significance (Gupta 2016, 50-51). Multiple linear regression is used when the dependent variable is explained with more than one independent variables. Explanation level of the regression, R Square, is composed from the square of differences in correlation (Metsämuuronen 2009, 709). Linear regression is often presented as the following formula;

$$Y = \beta_1 + \beta_2 x_2 + \beta_3 x_3 + \dots + \beta_K x_K + \varepsilon \quad (1)$$

In the formula, Y describes the dependent variable and X₂-X_K are independent variables where K is the number of variables. β_1 is the constant and β_2 - β_K are unknown parameters. In addition, ε describes the error term of the formula. (Metsämuuronen 2009, 721, Hill, Griffiths & Lim 2012, 172) As this research had to dependent variables, customer knowledge quality and competitive advantage as well as control variables, regressions were tested in a hierarchical manner with both of these terms as the dependent variable.

Multiple linear regression analysis involves underlying assumptions that should be met in order to make reliable interpretation from its results. Firstly, there should be linear relationship between dependent and independent variables. Secondly, the expected error of deviation is to be zero which means that in average errors would not exist. Thirdly, the variance of deviance should be the same as the value of constant. This can be also described as homoscedasticity of the model. The fourth assumption considers covariance of deviances which is expected to be zero. Fifthly, independent variables should not have linear relationship between each other, or in other words strong correlation. Finally, if the variables are normally distributed, also the deviances should be normally distributed (Hill et al. 2012, 172-173)

Before conducting regressions, Exploratory factor analysis (EFA) was used to compose and validate the questions to measures matching the theoretical concepts. The goal of the factor analysis is summarization and data reduction of multiple variables. Exploratory Factor Analysis seeks these variables with high communality from the data. (Hair et al. 1998, 121) It can be also used together or instead of Confirmatory Data Analysis (CFA), which is suitable in cases when theory has set assumptions to the research setting. In this study, EFA is used to create composite variables from questionnaire results to validate the groups of questions used to measure theoretical concepts of customer knowledge enablers, customer knowledge quality and competitive advantage. Similar to regression analysis, also factor analysis has some demands for the observations it is executed with (Hair et al. 1998, 80). First, the selected variables need to be intervals for example Likert scales (Hair et al. 1998, 98). Secondly, variables included in the factor analysis should have correlation over 0.3 at least with some of the variables (Metsämuuronen 2009, 649). Thirdly, the data set should have more observations than tested variables and desired amount should be 5 observations per variable (Hair et al. 1998, 100). Fourthly, outliers should be deleted from the data as they have great effect on the loadings of factors (Metsämuuronen 2009, 649). Finally, variables included in the analysis should have measure of sampling adequacy (MSA) over 0.5. (Hair et al. 1998, 102)

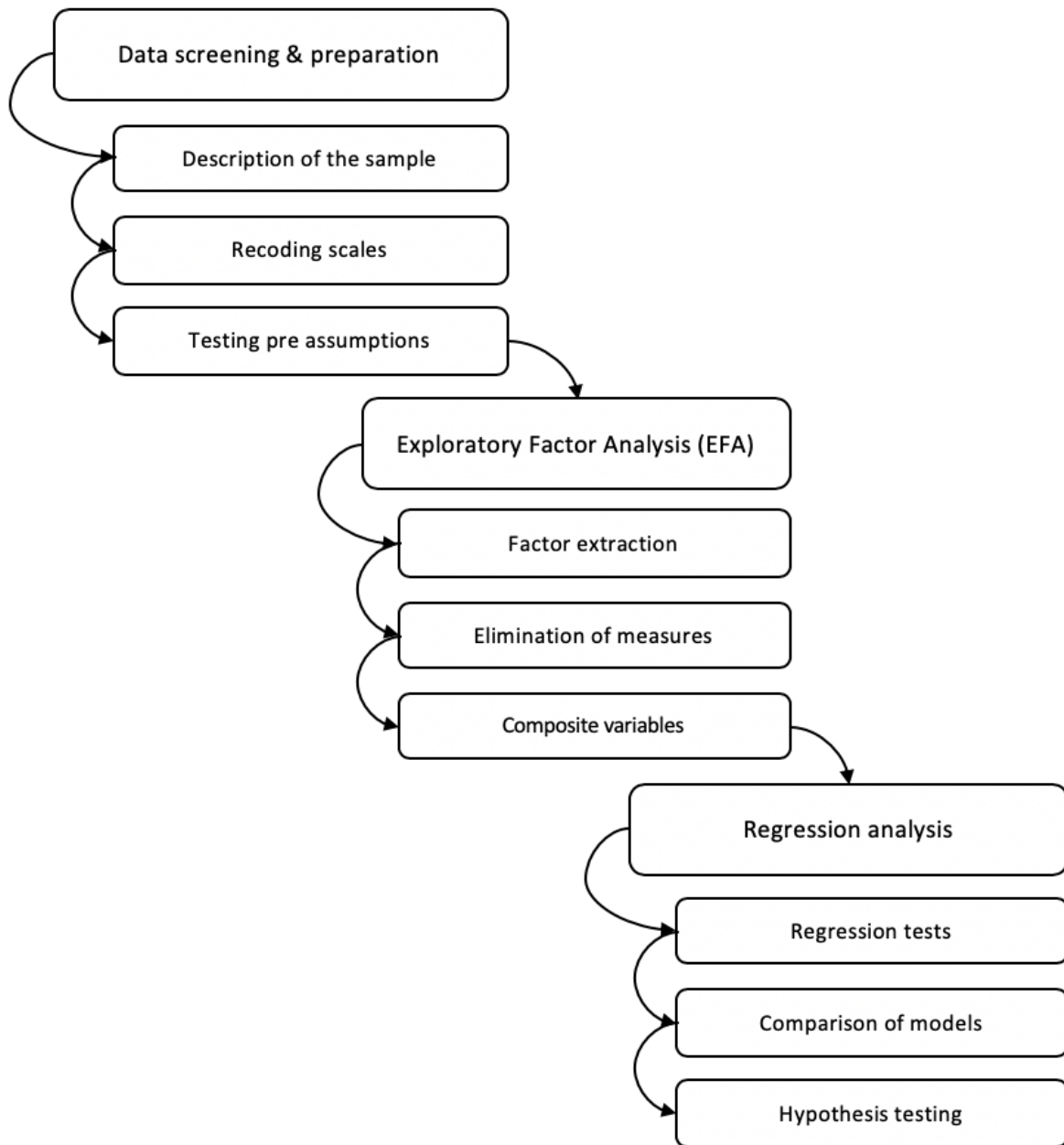


Figure 11. Data analysis process

Chapter 5 presenting the data analysis process follows the framework presented in Figure 11. The collected data sample is presented in chapter 5.1. The sample was screened from outliers and missing data points in addition to turning those questions with negative scales to match rest of the data set.

Then, basic descriptive statistics of the data sample were calculated and discussed. Exploratory data analysis process was introduced in chapter 5.2. In order to export factors from the data set, factor analysis with parallel analysis and oblimin rotation was used. Based on the factor models some variables were eliminated in order to achieve a simple structure. Then, composite variables were formed to describe the independent and dependent variables. In regression analysis, two different regressions were made – one with the customer knowledge quality as a dependent variable and another with competitive advantage as a dependent variable. Resulted models were compared in terms of significance first only with control variables and then with independent variables to find the best fitting model. Finally, hypotheses were discussed based on the results of the regression analysis.

The analysis was conducted with statistical program R. The software was selected as the analysis tool mainly for the personal interests of the author. R is a coding language and an open source software environment which provides a wide range of statistical and graphical tools for free (R Project 2019). It is inspired by Bell laboratories statistical programming language and environment S. R is highly extensible with command “packages” suitable for different statistical needs and therefore suitable for the needs of this study. R packages psych, Hmsic, parallel, GPArotation and corpcor were used in this study.

4.4. Reliability and validity

Reliability of a study is considered to be high if it produces similar results under consistent conditions (Metsämuuronen 2009, 75). This could be interpreted so that the study could be repeated by another researcher and the results should be in line with each other. Reliability should be considered during the execution as well as after the conduction of the study (Vilkka 2007, 149). Reliability can be tested in three different ways; by repeating the same study, conducting a parallel study or by measuring the internal statistics of the conducted test (Metsämuuronen 2009, 75). Internal statistics were the main method of the reliability in this research. Composite variables were composed based on the model that received best reliability results (Charts 5, 6 & 9). In regression analysis, different models and their reliability were reported in Chart 10 and Chart 11. In the light of existing circumstances, conducting similar research by another researcher with similar results should be possible.

Validity of the study describes how well the used research method measures the concept that it is designed to measure. Validity has two dimensions; external and internal (Metsämuuronen 2009). External validity considers the ability to generalize the results of the research. Internal validity on its turn, is about the contents of the study. These include theoretical terms and measurement scales, and how extensively they explain the researched phenomenon. This study had quite many scales to cover the wide topic of customer knowledge management. Also, three scales were created for the purposes of the study as previous studies had not measured theoretical concepts in quantitative manner. One of these scales, customer data integration, did not work well in empirical setting and needs further validation. Also, with larger sample size, the results could have been slightly different.

Unfortunately, goodness of these new scales could not be completely tested as the sample size of the study was only 73 observations. Acceptable sample size of a quantitative study is considered to be 100 observations (Metsämuuronen 2009, 10). According to Hair et al. (1998, 100), 50 observations is the absolute minimum and especially factor analysis is sensitive to the sample size. For this reason, factor analysis was run in parts. It is possible that the small number of respondents has affected the accuracy of research results. In order to control internal validity of the research, theoretical terms used in the questionnaire were tested with target group to minimize misunderstandings. As the questionnaire had quite complex technical terms and terminology differs based on the type of the field of business, misunderstandings are still possible. Each respondent answered questions about their organization's status from their own point of view which can be different depending on customer relationship tasks they are responsible of as well as performance indicators they are expected to achieve. This objective approach was based on assumption, that knowledge quality can be measured with its fitness for use (Ballou and Tayi 1999). For previous reasons, the findings of the empirical research should be considered directional for future studies and are not be generalized to all B2C organizations.

5. FINDINGS

In this chapter the process and findings of data analysis are presented in detail. First the description of the collected data set is presented and the suitability for factor analysis is confirmed. Secondly the factors are formed with parallel analysis and correlation matrix. Thirdly, the two regression analyses are conducted and their relation to hypothesis is discussed. First regression analysis tested hypotheses H1-H7 as second tested hypothesis H8.

5.1. Data sample descriptions

After deletion of clearly unfitting responses, final data set had 73 observations. Hence the questions were compulsory, the data set did not have any missing values. Also, no clear outlier observations were found from the sample.

The validity of the survey was controlled with two key questions; the job title of the respondent and if their organization operate in B2B market, B2C market or both. Based on overall screening of the data, the respondents seemed to work in positions suitable for the purposes of this research. For example, people with the title of Marketing manager, Content designer, Head of Marketing and Customer relationship manager responded to the survey. The second question about the operating market received all three types of answers, were B2C market was most popular (58 answers), B2B least popular (8 answers) and both was in the middle ground (15). Results of those respondents operating only in B2B sector were excluded from the study as the questionnaire was targeted only to B2C organizations and the amount of B2B organizations was too small for comparative analysis. 50% of the respondents reported their organization to be operating in retail industry, 25% in ICT and communications, 16% in Transportation and logistics, 6% in Finance and banking and 3% in Energy (Chart 2).

What comes to the size of the organizations, majority of the respondents were from large companies and about one third were from SMEs. 7% of the respondents had less than 50 employees, 27% between 50 and 500, 38% from 500 to 2500 and 28% more than 2500. Similarly, 6% of the respondents had less than 5 million yearly revenue, 22% between 5 and 50 million, 40% from 50 to 500 and 32% more than 500 million. Revenues and number of employees are presented in Chart 3.

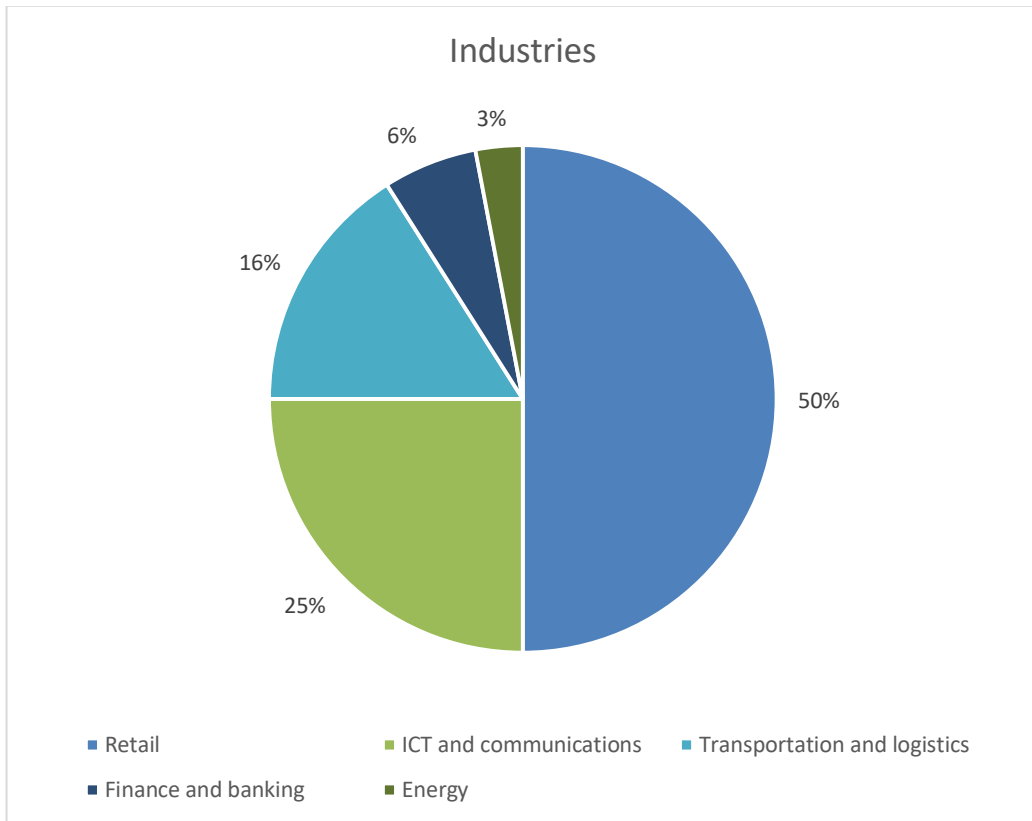


Table 2. Respondent industries

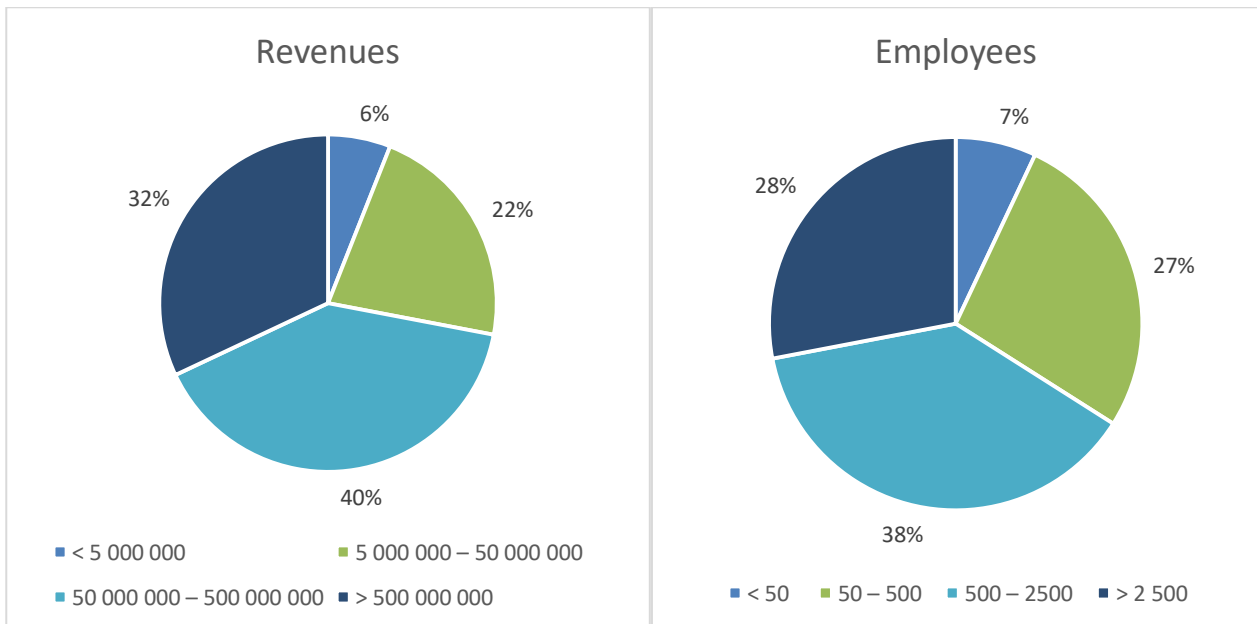


Table 3. Yearly revenues and amounts of employees in respondent organizations

5.2. Exploratory factor analysis and composite variables

Before proceeding to the actual analysis, the data set was screened for factor analysis specific assumptions. Normality, linearity and homoskedasticity were tested visually and no issues were found. What comes to correlation, only one question (ICV3) had correlations under 0.3 with CKS1, BP1 and BP3. The question did have high correlations (0.30-0.73) with other variables, so it was kept in the analysis. All variables were tested for sampling adequacy with Kaiser-Meyer-Olkin (KMO) test and received the exact value of 0.5, which is the minimum requirement for proceeding. Data set size on its turn did not meet the demands because of the low response rate of the questionnaire (73 observations). In order to get better ratio for factors and observations, factor analysis was made in three parts; first one with organizational and human enablers, second with technological enablers and the third with customer knowledge quality and competitive advantage.

After checking that the data is suitable for factor analysis, 10 questions about organizational enablers were first examined. Number of factors were tested with parallel scree plot analysis (Chart 4). In the Chart 4, the red line crosses the blue line indicating 3 big eigenvalues. In addition to the visualization, R returned a result that the first factor data set would have 3 principal components and therefore 3 factors. This result was in line with the theory assumption that had organizational enablers.

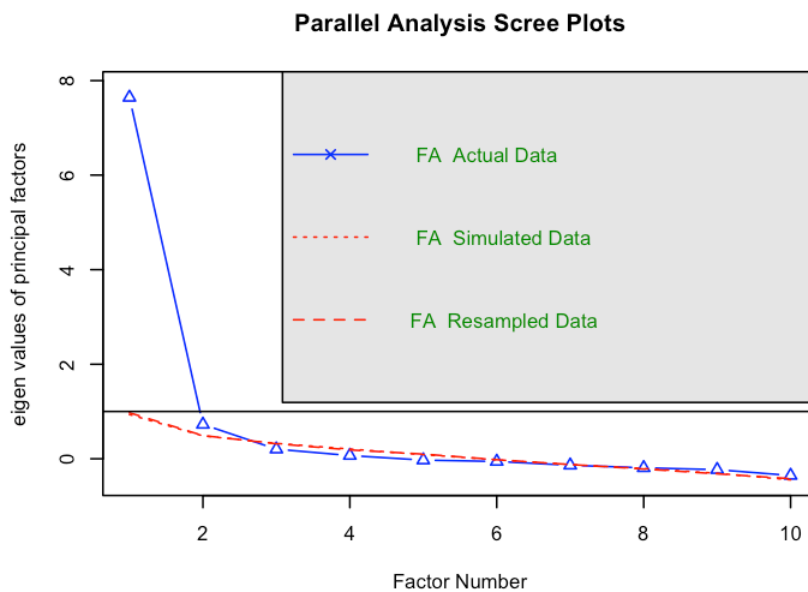


Table 4. Parallel analysis, Organizational enablers

Based on parallel analysis results, the first factor analysis was made with 3 factors. Because of the small data set, factor loadings were expected to be 0.6 or stronger based on Hair et al. (1998, 100) criteria for exploratory factor analysis with smaller data sets. Maximum likelihood was used with oblimin rotation as the factors were assumed to correlate together. The first attempt of the factor analysis did not give a simple structure where all questions would have a clear loading to one factor. Two questions; BP2 and CU3 appeared to have double loadings and quite low communalities (0.5 and 0.3) indicating that they did not have clear factor to load to. The questions were removed from the model and analysis was run with rest of the variables. After this adjustment, simple structure was achieved. Loadings were acceptably strong (0.78-0.95) and communalities were also good (0.92-0.99). The reliability of all the factors measured with Crochbach's alpha was very close to 1 (0.96-0.98) which is a very good result.

Question	Factor 1	Factor 2	Factor 3	Communality
CKS1	0,89			0,95
CKS2	0,85			0,92
CKS3	0,92			0,94
BP1		0,99		0,98
BP3		0,83		0,99
CU1			0,88	0,96
CU2			0,95	0,99
CU4			0,78	0,99
SS loadings	2,92	2,55	2,28	
Propotion variance	0,36	0,32	0,29	
Cum variance	0,36	0,68	0,97	
Propotion explained	0,38	0,33	0,29	
Cum propotion	0,38	0,71	1	
Cronbach's alpha	0,96	0,98	0,97	

Notes : Factor analysis, Organizational enablers

Table 5. First factor analysis results, Organizational enablers

Unlike the first parallel analysis, the second one did not line up with theoretical assumptions. Theory suggested that 12 questions measuring technological and human enablers, would load to factors. Visual presentation of the second parallel analysis results (Chart 6) as well as R suggestion for principal components was 3. To see the results of both possibilities and the unfitting questions, second factor analysis was made with both number of factors.

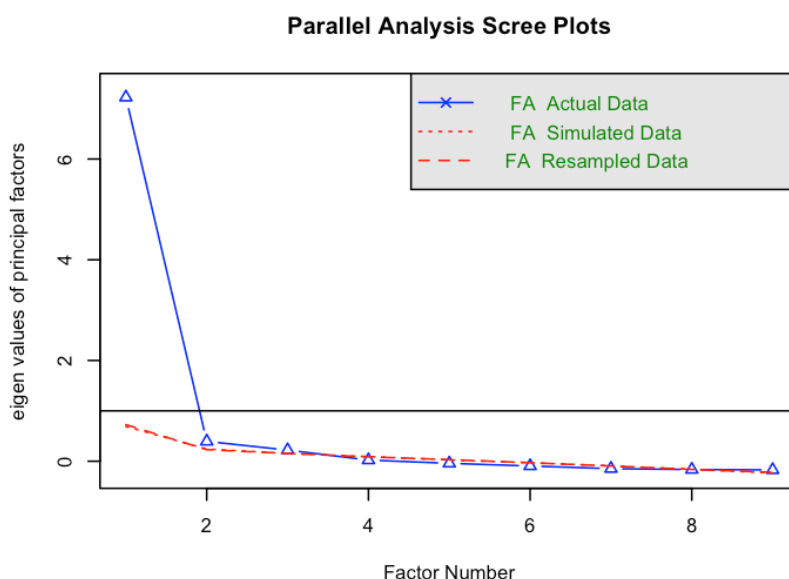


Table 6. Parallel analysis, Technological and human enablers

Second factor analysis was made as the first one. As it could be expected based on the theoretical and statistical misfit, factor analysis of technological and human enablers needed some adjustment. Questions regarding customer data integration split to multiple different factors without theoretical logic. They also had low communalities (0.31-0.4) compared to other variables. As it seemed that this measurement scale was too problematic, questions ICV1, ICV2 and ICV3 were deleted from the analysis completely. After the deletion of the assumed fourth factor, the rest of the variables loaded nicely to three factors in line with parallel analysis suggestion (Chart 7). Loadings varied from 0.61 to 0.95 and customer data governance getting little lower scores, but in an acceptable rate based on Hair et al. (1998, 100). Communalities were also good (0.8-0.99). Also, Cronbach's alphas were excellent, as they were over 0.97 for all of the factors.

	Factor 1	Factor 2	Factor 3	Communality
CRM1	0,91			0,8
CRM2	0,93			0,95
CRM3	0,91			0,99
CKC1		0,95		0,98
CKC2		0,93		0,97
CKC3		0,91		0,96
CDG1			0,62	0,82
CDG2			0,61	0,84
CDG3			0,69	0,95
SS loadings	3,67	3,31	1,37	
Propotion variance	0,41	0,37	0,15	
Cum variance	0,41	0,78	0,93	
Propotion explained	0,44	0,4	0,16	
Cum propotion	0,44	0,84	1	
Cronbach's alpha	0,97	0,98	0,98	

Notes: Factor analysis, Technological and human enablers

Table 7. Factor analysis results, Technological and human enablers

The final factor analysis covering customer knowledge quality and competitive advantage included 8 questions. The third parallel analysis give 2 factors as a result, which in its turn, was in line with the theory. In Chart 8, interpretation could be 1 or 2 factors but as R returned 2 factors, this was the selected amount for factor analysis. Third factor analysis was also made with maximum likelihood and oblimin rotation. This model also needed some adjustment, as question CKQ3 loaded to two factors. No other adjustments were needed as factor loadings were on an acceptable level ranging from 0.63 to 0.88 and communalities were excellent (0.97-0.99). Also, Cronbach's alphas were excellent, as they were over 0.97 for all of the factors.

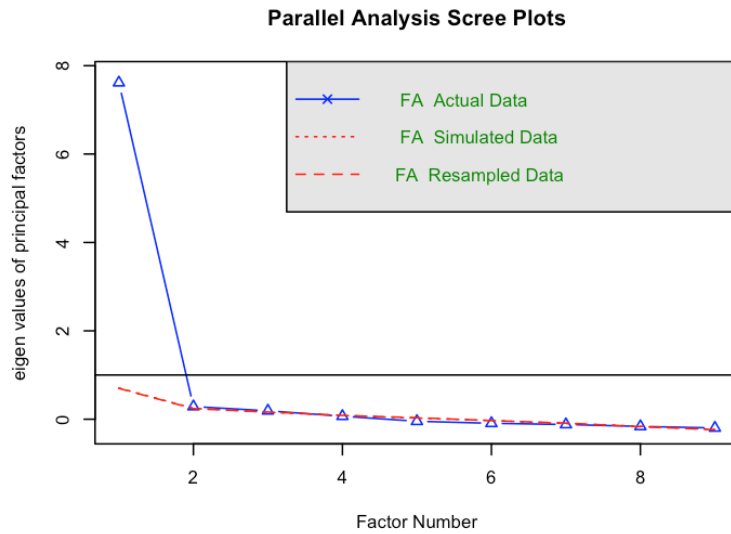


Table 8. Parallel analysis, Customer knowledge quality and competitive advantage

	Factor 1	Factor 2	Communality
CKQ1		0,88	0,99
CKQ2		0,63	0,97
CKQ4		0,68	0,96
CKQ5		0,73	0,98
CA1	0,79		0,9
CA2	0,88		0,99
CA3	0,85		0,99
SS loadings	3,87	2,92	
Propotion variance	0,55	0,42	
Cum variance	0,55	0,97	
Propotion explained	0,57	0,43	
Cum propotion	0,57	1	
Cronbach's alpha	0,96	0,97	

Notes: Factor analysis, Customer knowlesge quality and competitive advantage

Table 9. Factor analysis results, Customer knowledge quality and competitive advantage

Based on factor analysis results, eight composite variables were created from the mean values of the variables that loaded to each factor. Summary statistics of the composite variables can be seen in Chart 10. Mean values ranged between 4.72 – 6.17, highest scores coming from customer knowledge management strategy and CRM technology and lowest from customer data governance. Standard deviations varied between 2.4 – 3.1.

Label	Name	Mean	SD	Min	Max	N
CKS	Customer knowledge strategy	6,17	3,1	3,00	9,67	73
BP	Knowledge-oriented business processes	5,13	2,8	1,00	10,00	73
CU	Supportive culture	5,97	2,4	2,00	9,67	73
CRM	CRM technology	6,25	3	2,00	10,00	73
CDG	Customer data governance	4,72	2,3	1,00	9,33	73
CKC	CKM competence	5,50	2,8	2,67	9,33	73
CKQ	Customer knowledge quality	5,40	3,1	1,00	9,25	73
CA	Competitive advantage	6,06	2,9	2,00	10,00	73

Table 10. Summary of the composite variables

5.3. Regression analysis and hypothesis testing

Regression analysis was conducted with the created composite variables in two parts. First regression test was made with the customer knowledge management enablers as independent factors and customer knowledge quality as the dependent variable. As integrated customer view component was dropped out in factor analysis, customer knowledge quality was tested with 6 enablers instead the original 7. Results of the first regression analysis are summarized in Chart 11. From the summary chart it can be seen that knowledge-oriented business processes have little effect (0.08) on customer knowledge quality on the contrary to expectations. T value (1.3) and p values (0.18) indicate also that the result is insufficient. Other variables do have positive effect on customer knowledge quality and

do support the theoretical assumptions. Model fit is good was terms of R-squared (0.95), F value (210) and p value (< 0.001).

	<i>Coefficient</i>	<i>SE</i>	<i>t value</i>	<i>Pr(> t)</i>
Constant	1,50281	0,38718	3,881	0,000245***
Customer knowledge strategy	0,52436	0,1005	5,217	0,00000203***
Knowledge oriented business processes	0,0839	0,06329	1,326	0,189603
Supportive culture	0,25857	0,06433	4,019	0,000154***
CRM technology	0,21308	0,1045	2,039	0,045517*
Customer data governance	0,87447	0,06506	13,442	0,00000203***
CKM competence	0,42811	0,10947	3,911	0,000222***
R-squared	0,9509			
Model fit (F value)	210			
p value	0,00000203***			

*** <0.001 ** <0.01 * <0.05, *Dependent variable: Customer knowledge quality*

Table 11. Results of the first regression, Customer knowledge quality

Second regression was made with customer knowledge quality as the independent variable and competitive advantage as the dependent variable. Control variables were used in the second regression test gradually. First control variables were tested without independent variable to indicate its individual effect to dependent variable. Then control variables and independent variable were tested together to see the effect of customer knowledge quality. Results of the second regression analysis is summarized in Chart 12 with and without dependent variables. In the first model that had only control variables, revenue has slightly negative influence on competitive advantage. Also, the high p value indicated (0.29) that the relationship was not significant as the negative effect would be true only in 70% of the cases. Similar results occurred with when in the second model where dependent variables were added. Number of employees on its turn, had positive effect on competitive advantage in both of the models (0.4 and 0.1). According to the theoretical assumption, customer

knowledge quality had a strong positive effect (0.80) to competitive advantage. Model fit was good in terms of R-squared (0.95), F value (210) and p value (< 0.001).

Model 1				
	<i>Coefficient</i>	<i>SE</i>	<i>t value</i>	<i>Pr(> t)</i>
Constant	3,0346	0,813	3,733	0,000386***
Revenue	-0,1888	0,1799	-1,05	0,297501
Amount of employees	0,4228	0,116	3,643	0,000517***
R-squared	0,389			
Adjusted R-squared	0,371			
Model fit (F value)	21,96			
p value	0,00000203***			
Model 2				
	<i>Coefficient</i>	<i>SE</i>	<i>t value</i>	<i>Pr(> t)</i>
Constant	1,14799	0,32602	3,521	0,000772***
Revenue	-0,07472	0,06928	-1,078	0,284637
Amount of employees	0,1121	0,04717	2,376	0,020311*
Customer knowledge quality	0,80004	0,03999	20,006	0,0000000000000002***
R-squared	0,9113			
Adjusted R-squared	0,9074			
Change in R-squared	0,5223			
Model fit (F value)	232,8			
p value	0,00000203***			

*** <0.001 ** <0.01 * <0.05, *Dependent variable: Competitive advantage*

Table 12. Results of the second regression, Competitive advantage

In summary, results of the regression analyses gave support to four customer knowledge enablers and the positive effect of customer knowledge quality to competitive advantage. Control variable of revenue turned out to be insignificant and number of employees had some positive effect on competitive advantage. In terms of the research hypothesis this means the following;

<i>H1. Customer knowledge strategy has a positive effect on customer knowledge quality</i>	0.52
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Customer knowledge strategy had positive effect (0.52) on customer knowledge quality with less than 0.001 level of error. First hypothesis of the study is therefore supported by the empirical analysis.

<i>H2. Knowledge-oriented business processes have a positive effect on customer knowledge quality</i>	NS
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Knowledge-oriented business processes did have a slight effect (0.083) on the customer knowledge quality but the result was not significant as its p value was 0.18. Therefore hypothesis 2 was not supported.

<i>H3. Supportive culture has a positive effect on customer knowledge quality</i>	0.25
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Supportive culture did have positive effect on customer knowledge quality (0.25) and its was significant with 99% confidence level. Hypothesis 3 was supported by the data.

<i>H4. CRM technology enhances customer knowledge quality</i>	0.21
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Also, CRM technology had positive effect (0.21) on customer knowledge quality. This result had a slightly higher error value ($p < 0.05$) but was also in the acceptable range. Hypothesis 4 was therefore supported by the data analysis.

<i>H5. Customer knowledge integration enhances customer knowledge quality</i>	NS
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Variables indicating integrated customer were dropped off in the empirical factor analysis. Therefore, hypothesis 5 was not supported by the empirical research.

<i>H6. Customer data governance enhances customer knowledge quality</i>	0.87
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Customer data governance had the highest positive effect (0.87) of the tested variables on customer knowledge quality. This result was also significant as the p value was less than 0.001. Hypothesis 6 was supported based on the regression results.

<i>H7. Organizations competence in customer knowledge management enhances customer knowledge quality</i>	0.42
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Organizations competence in customer knowledge management had also a positive effect on customer knowledge quality. Also, this relationship had 99% significance level. Hypothesis 7 was therefore supported.

<i>H8. Customer knowledge quality has a positive effect on competitive advantage</i>	0.80
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Customer knowledge quality had a very strong positive effect on competitive advantage. The result was significant with 99% confidence level. Finally, Hypothesis 8 was supported based on empirical findings.

Results of empirical research and relationships of enablers, customer knowledge quality, control variables and competitive advantage are summarized in Figure 12. Three relationships of the original research framework turned out to be non-significant. These were knowledge-oriented business processes' and integrated customer view's effect on customer knowledge quality and yearly revenue's effect on competitive advantage. Out of customer knowledge management enablers, technological

enabler customer data governance (0.87) and organizational enabler customer knowledge strategy (0.52) had the strongest effects on customer knowledge quality. Also, the customer knowledge quality had a significant effect on competitive advantage (0.8). In addition, supportive culture, CRM technology and customer knowledge management skills had significant effects (0.21-0.42) on customer knowledge quality.

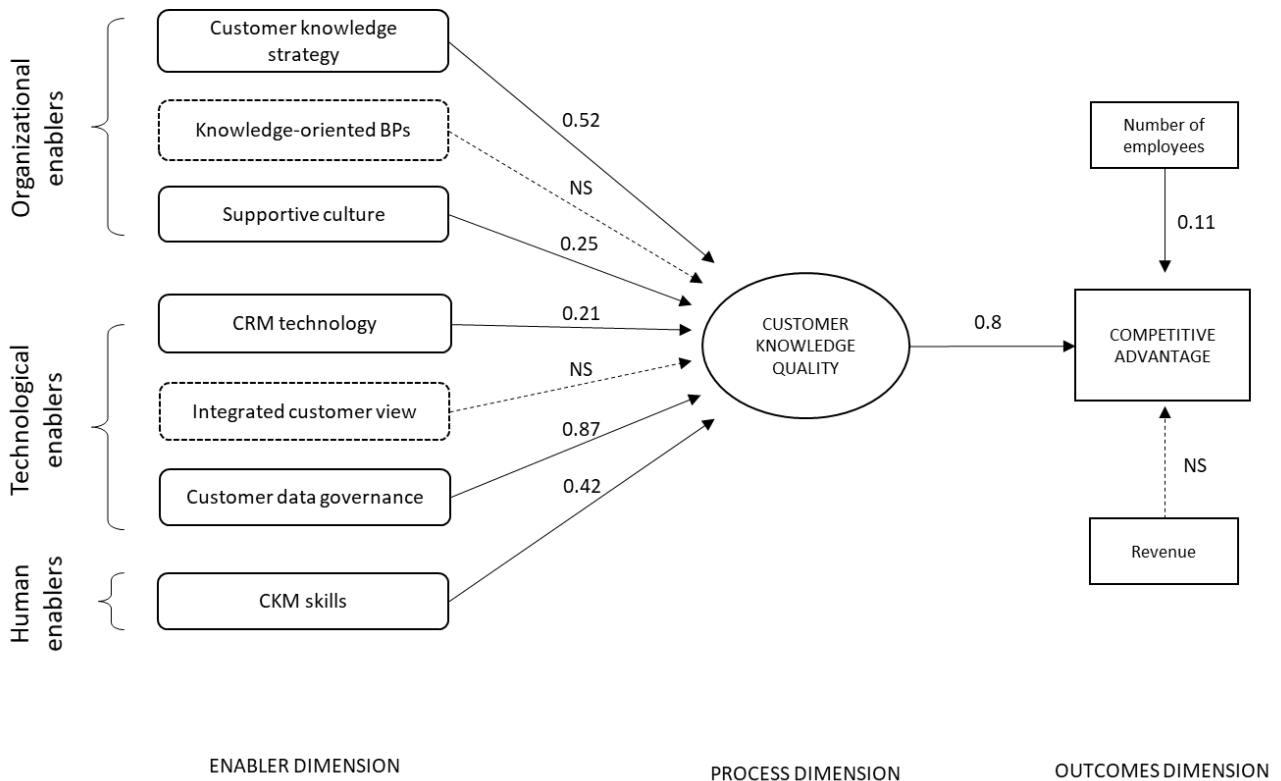


Figure 12. Summary of the empirical research results

In conclusion, the empirical research part of the thesis mostly supported the suggested hypotheses and therefore did give a good base for further development of customer knowledge management framework. Both significant and insignificant results of the empirical analysis gave important information about the characteristics of customer knowledge management in B2C markets. In the following chapter, findings of the empirical data analysis are discussed in relation to customer knowledge management research and conclusions of the study are summarized.

6. DISCUSSION

In this chapter, the findings of empirical analysis are discussed in the light of previous literature. The sub-research questions and main research question are answered based on theoretical and empirical outcomes of the study. Finally, adjusted framework for customer knowledge management in B2C markets is presented.

6.1. Key outcomes of the research

Outcomes of this research can be summarized to three key findings: definition of customer knowledge characteristics in B2C markets, the effects of customer knowledge enablers to customer knowledge quality and the finding that customer knowledge can be a source of competitive advantage in B2C markets.

First outcome of this study was that customer knowledge management in B2C markets is more dependent on explicit knowledge than customer knowledge management in B2B markets where tacit knowledge gained via personal relations has greater importance (see Chapter 2.1.1. Customer knowledge types). This study differed from previous in the approach of measuring this process as it was stated that with these activities, no matter their specific form, good quality customer knowledge is created as an output. As measuring quality of these abilities and activities in different type, size and industry organizations is difficult, the focus of this study was moved towards the output of the process; high quality customer knowledge.

In the empirical part of the research, customer knowledge quality was measured with data quality measures of Ballou and Tayi (1999); accuracy, timeliness, consistency, completeness and fitness for use. It was argued that as explicit knowledge is based on data, the data quality measures can be transformed to knowledge quality measures. Factor analysis (see Chapter 5.2. Exploratory Factor Analysis) pointed out that the question of the measurement scale regarding consistency of the knowledge was not in line with other knowledge quality measures and had to be taken off the analysis. This might indicate that customer knowledge consistency is not as easy to achieve as other measures of customer knowledge quality and therefore did not group together with other quality measures in statistical tests. Consistency is about the format and continuity of the data (Ballou and Tayi 1999);

for example, the answers of the customer who responds to the same customer satisfaction survey each year are consistent data. Consistency needs good planning from the start and might need multiple years to reach its value. Even though consistency measure was not used in the empirical analysis of the study, it is certainly an interesting factor that deserves deeper study.

Second outcome of the study was the definition of enablers of customer knowledge management in B2C markets. Previous research suggest that knowledge management processes are influenced by three types of enabler factors; organizational enablers, technical enablers and human enablers (Lin 2007). This study suggested six enablers based on academic research about customer relationship management, customer knowledge management and data management. Most of these enablers are based on review study by Khosravi et al. (2018) and additional approaches are taken from master data management studies by Silvola et al. (2011). Organizational enablers included customer knowledge strategy, knowledge-oriented business processes and supportive culture. Technological enablers CRM technologies, customer knowledge integration and customer data governance. Human enabler category included customer knowledge management capability.

Quantitative empirical research supported five of these seven enablers; customer knowledge strategy, supportive culture, CRM technology, customer data governance and CKM competence. Customer data governance, which had not been tested before in this context, had the greatest effect on customer knowledge quality. This is surprising as technological enablers have been considered to have less effect on customer knowledge management outcomes than organizational and human factors for example by Khosravi et al (2018). Also, customer data governance was found to have a lot more significance (0.87) on customer knowledge quality than CRM technology (0.21). Previously, technological enablers have been measured with focus on certain tools, rather than technology architecture of the company. This result is in line with Silvola et al. (2011) argument that IT tools are not sufficient without properly integrated architecture and data management practices.

Customer knowledge strategy had the second highest positive impact on customer data quality (0.52). This finding in line with previous studies (Khosravi and Hussin 2018, Buchnowska 2011) and supports the statement that strategy is key element in technological transformations (Roberts et al. 2005). Supportive culture had also a significant positive effect on customer knowledge quality (0.25).

This result is consistent with the findings from Salojärvi et al. (2013), Gibbert et al. (2002) and Tseng and Fang (2015). Previous studies have also given supportive results about the role of top management support (Khosravi et al. 2018) and co-operation of teams (eg. Salojärvi and Saarenketo 2010), which are in line with these organizational themes. It can be concluded that systematic support and strategy implementation are important for high quality customer knowledge.

Human enabler CKM competence also received a high result in the empirical test as it explained 0.42 of the customer knowledge quality. This indicates that organizations benefit from expertise on collection, analyzing and usage of customer knowledge which is in line with the findings of eg. Khosravi et al. (2018), Attafar et al. (2013) and Wu et al. (2013). As cross-functional understanding on data quality is raised as an important factor also in previous research (Silvola et al. 2011), it can be concluded that increasement of customer knowledge management competence in all levels of the organization enhances the quality of customer knowledge.

On the contrary to the assumption, technological enabler customer knowledge integration was not found to have statistically significant effect on customer knowledge quality. Khosravi et al. (2018) received similar results with their knowledge map idea or structured customer knowledge view. This could be an indication that not all employees working with the same customer need to see all collected the information, but it is more important to have the knowledge available for those who need it. Also, organizational enabler of knowledge-oriented business processes did not have a significant effect on the customer data quality. This finding resonates the difficulty of measurement as processes vary between industries and depend largely on the size of company. It is also possible that the business processes linked to customer knowledge processes do not have direct effect on customer knowledge quality. It could be that significant results can be found with different measurement methodology.

Third and final outcome of the research was the verification of positive relationship between customer knowledge quality and competitive advantage. In line with the hypothesis and previous suggestions by Garcia-Murillo and Annabi (2002), Gibbert et al. (2002) and Lee et al. (2011), results of the empirical study show that customer knowledge quality has a strong positive effect on competitive advantage in B2C markets. Interestingly, the regression analysis revealed that company's revenue level did not have much to do with competitive advantage. This is not in line with pre-assumptions

but might indicate that especially in the case of customer insights, smaller companies are able to gain competitive advantage like their bigger competitors. Competitive advantage measurement scale included also financial success which could indicate that customer knowledge quality is linked to profit rather than revenue. Nevertheless, it can be concluded that high customer knowledge is a strategic asset for B2C organizations and customer knowledge management practices that generate this knowledge can lead to competitive advantage in B2C markets. In the next chapter, these findings are discussed in the light of the research questions.

6.2. Conclusions on research questions

The aim of this study was to understand customer knowledge management in B2C context and if it could be strategic asset for organizations operating in consumer markets. To approach this problem step by step, one main research question and three sub-research questions were designed. First sub-research question was formed as following;

SRQ1. What are the characteristics of good customer knowledge management in B2C business?

This question was discussed mostly in theoretical part of the study research (see Chapter 2.1. Customer knowledge in B2C markets) and utilized to structure measurements for empirical analysis. Based on theoretical and empirical findings, characteristics of good customer knowledge management in B2C business are abilities to transform customer data to information and finally to accurate, timely, complete and fit for use customer knowledge. Because of the nature of B2C markets most useful customer knowledge is explicit-kind, which is described as objective, rational, data-based, easy to communicate, mainly knowledge about and for customer, codable, storable and shareable via IT systems as well as crucial for customer relationship development (See Table 1).

Theoretical research came into the conclusion that good customer knowledge management produces high-quality customer knowledge. This is a new kind of approach, compared to previous studies, focused on customer knowledge management in B2B markets, but in line with the assumption of knowledge management theories (eg. Ballou and Tayi 1999) and master data management research

(eg. Silvola et al. 2011). Based on empirical research and its findings, it adapts well to the general knowledge management framework of Lin (2007) (see Figure 1).

Continuing to understand other organizational factors effecting customer knowledge management and its quality, second sub-research question was written to following form;

SRQ2. What are the enablers of good customer knowledge management in B2C business?

Similar to the first sub-research question, second sub-research question was discussed in theoretical part of the study research (see Chapter 2.2. Customer knowledge management enablers) and confirmed in empirical analysis. Based on empirical and theoretical findings, customer knowledge management has enablers in B2C markets in organizational, technological and human categories introduced by Lin (2007). In this context empirically verified organizational enablers include customer knowledge strategy and supportive culture. Technological enablers include customer data governance and CRM technology. Human enablers include skills in customer knowledge management.

To understand the dynamics of different enablers, customer knowledge quality and competitive advantage, third research question was formed in the following form;

SRQ3. Which enablers of customer knowledge management enhance customer knowledge quality and indirectly competitive advantage in B2C business?

On the contrary to previous questions, third sub-research question was tested with empirical methods. Based on these findings, it can be concluded that customer knowledge management can result in high quality customer knowledge which can generate competitive advantage in B2C markets. Further on, customer knowledge quality is better in organizations that have strong customer knowledge strategy, supportive culture, customer data management, CRM technology and CKM skills. Customer data governance raised from the results as the most effective enabler. On the contrary to the hypothesis, knowledge-oriented business processes or customer knowledge integration did not receive empirical support.

Finally, the main research question of the study was the following;

RQ1. How can customer knowledge management create competitive advantage in B2C business?

Theoretical and empirical sections of the research structured with sub-research gave grounding to answer the main-research question. Customer knowledge management can create competitive in two ways. First of the ways is creating the best possible process for customer knowledge management which results in high quality customer knowledge. Empirical findings show that this high-quality customer knowledge is positively correlated with competitive advantage. Second way is the operational actions done with the available knowledge. This two-fold conclusion is in line with Nonaka and Krogh's (2009) idea of tacit and explicit knowledge differences which can be implemented to customer knowledge management.

Customer knowledge management actions that result in customer knowledge, are affected by presented customer knowledge management enablers. All of the organizational, technological and human categories received high significance results in empirical analysis and therefore should be developed parallel to each other as they indirectly affect competitive advantage of the company. In conclusion, theoretical and empirical sections of this research were able to answer all the stated research questions. As a summary of these findings, customer knowledge framework for B2C markets is presented in the following chapter.

6.3. Customer knowledge management framework for B2C markets

Based on theoretical and empirical findings, customer knowledge management framework for B2C markets was created in line with Lin's (2007) general knowledge management framework, Khosravi (2018) suggestions for CKM enablers and Ballou and Tayi's (1999) model. The framework is presented in Figure 13. As Lin's (2007) framework it is divided to three sections; enablers, process and outcomes. Five enablers verified in this study are customer knowledge strategy, supportive culture, CRM technology, customer data governance and customer knowledge management skills.

These enablers linked to high quality customer knowledge, which is accurate, timely, complete and fit for use customer knowledge. High quality customer knowledge is the output of customer knowledge activities and the transformation of customer data to customer information and finally to knowledge (see Figure 5, Customer knowledge management process).

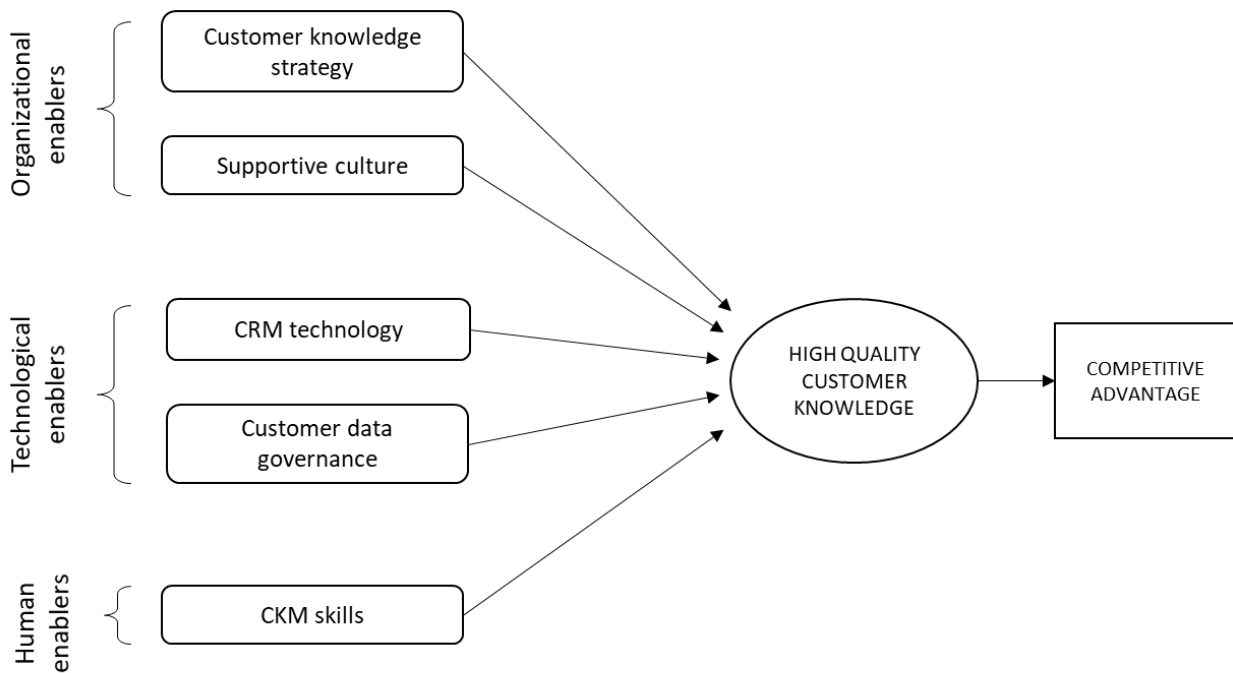


Figure 13. Final framework of customer knowledge management for B2C markets

The framework shows that customer knowledge management can create competitive when its outcome, customer knowledge is high quality. Customer knowledge quality can be in turn reached with customer knowledge management activities eg. collection, analyzing and usage of customer knowledge. These activities as well as the form of “high quality” customer knowledge depend on the size and type of the organization. In B2C markets, customer knowledge is mostly explicit or developed from explicit knowledge (see Chapter 2.1.1. Customer knowledge types). Based on this, customer knowledge management framework is in line with Nonaka’s (1994) explicit and tacit knowledge dialogue and customer knowledge creation process of Zeleny and Henry (Figure 5). As the aim was to create a holistic framework for B2C markets, these steps are not defined further. It should be kept in mind that this model is only one perspective of the customer knowledge

management concept and can be different in terms of enablers with different outcomes eg. customer performance or profitability of the company. Also, it is possible that some undefined enabler was not tested in the model.

7. CONCLUSIONS

This chapter summarizes the conducted research and concludes the main findings. First, theoretical contributions of the thesis are presented followed by suggestions for managerial implications. Finally, limitations and future research directions are suggested.

7.4. Theoretical contributions

This study completes the field of customer knowledge management research with B2C point of view and first holistic version of theoretical framework of enablers and CKM quality in this context. New theoretical contributions are the definition of tacit and explicit customer knowledge differences (Table 1), customer knowledge creation process for B2C markets (Figure 5), customer knowledge quality measurements, empirical results of customer knowledge quality enablers and effect on competitive advantage and finally the framework for customer knowledge management for B2C markets (Figure 12).

In this study, the essence of knowledge was discussed thoroughly to understand holistic picture of customer knowledge. It was concluded in the theory section that in B2C customer knowledge is either tacit or explicit and for B2C markets their characteristics were defined (see Chapter 2.1. Customer knowledge in B2C business). In line with this customer knowledge in B2C markets is mostly stored and distributed via IT systems and the management of customer knowledge differs from B2B customer knowledge. As this approach differs from previous studies and sets customer knowledge management closer to technology and data management. Therefore, approaches have been taken from academic fields of data and technology to enablers of customer knowledge management.

This study approaches customer knowledge management not only from the perspective of technology and data management, but also from traditional knowledge management point of view. In support of approach used by Rollins and Halinen (2005), the process for customer knowledge creation was created by merging data-information-knowledge pyramid of Henry (1974) with SECI model of Nonaka (1994). This approach explains how customer data transforms into customer information and finally to customer knowledge. It clarifies that customer knowledge management is not about individual actions but about managing and developing the knowledge flows in the organization to

match the customer's situation in real life as closely as possible. This demands two types of customer knowledge management – operational and strategic. Previously presented hammer example by Nonaka and Krogh (2009) fits into this context as the operational customer knowledge management is the “ability to use the customer knowledge “ and strategic customer knowledge management is the “ability to design the best customer knowledge process”.

This study contributes academic research also by defining holistic measures for customer knowledge quality. Customer knowledge quality is defined in this context with the data quality measures of Ballou and Tayi (1999) as the B2C customer knowledge is often explicit or based on explicit knowledge. Empirical results excluded consistency from these traditional measures. This approach of accurate, timely, complete and fit for use customer knowledge, should last time better than practical definitions of data types.

New findings include that customer knowledge management does have more enablers than previous studies have suggested. Empirical research supports the findings by Silvola et al. (2010) and Ofner et al. (2013) about the importance of data management as customer data governance resulted to be the most significant enabler of customer knowledge quality. This is interesting finding as it brings focus from specific technologies to the whole IT architecture and data flow design.

Another contribution of the study was that the positive relationship between customer knowledge quality and competitive advantage was confirmed. This is theoretically significant for two reasons. First, customer knowledge management's effect on competitive advantage has not been verified previously which supports the statements of several authors (eg. Garcia-Murillo and Annabi, 2002; Gibbert et al. 2002). Second, the effect between high quality knowledge and competitive advantage was found rather than relationship between CKM activities and competitive advantage. This supports the assumption made in this study that process steps are not as important as the output. Overall, this study suggests that CKM research should focus on development of measurement scales that last time with fast technological improvements and new innovations and that are adaptable to any industry and firm size.

Customer knowledge management framework for B2C markets (Figure 13) is a theoretical foundation for future research described in the final chapter of this thesis. It presents empirically significant enablers in B2C markets as well as relationship of customer knowledge quality and competitive advantage. As the framework is first of its kind, it demands further development and empirical testing. Hopefully, the findings of this research will inspire more studies in this area.

7.5. Practical implications

As stated in the introduction of this thesis, customer knowledge management is a difficult area for companies and this topic needs further support from academic research. Empirical results of this study showed that those who master generation of high-quality customer knowledge also gain competitive advantage. Based on these findings, managers should focus on measuring and improving customer knowledge quality. What is more, empirical findings show that customer knowledge strategy, customer data governance and CKM skills are the most effective enablers that enhance high quality customer knowledge. These are the three main components that companies should first focus on with their customer knowledge management practices. Other significant enablers were supportive culture and CRM technology, which should facilitate the quality improvement of customer knowledge.

As for any business operation, it is important for managers to define a clear customer knowledge strategy for their customer knowledge management execution. This strategy should include realistic analysis of the current situation, policies and scope in which these issues are addressed and action plan for the strategy implementation (Rumert 2012). Empirical research results show that the strategy should aim for customer knowledge quality rather than specific customer knowledge management activities or tools. As a part of the strategy implementation, getting the support from employees to make a transformation is significant. This was seen in from the empirical results that showed the link between supportive culture and customer knowledge quality. Managers should therefore clarify goals for themselves and communicate these goals to the organization.

Findings also suggest that managers should focus on customer data governance and systematic management of customer master data. Data governance is a horizontal function which needs co-

operation of multiple teams and partners. As customer knowledge quality was found to have a positive connection with competitive advantage, managers should first understand the status of their customer knowledge quality and then start to systematically measure and improve it. Similar actions were already suggested by Ballou and Tayi (1999). When organization starts to improve their knowledge quality all parts of the customer knowledge process should be considered – where, how and by whom the customer knowledge is collected, analyzed and used. Master data management specialists and those professionals operating between business and data are important for the success for these kind of transformation projects. Selection of suitable CRM technology and designing its integrations to other systems are important for the big picture as usually CRM is the master data repository for customer knowledge.

Because of constantly increasing customer demands for more and more tailored customer experience, organizations need more customer-specific knowledge to execute successful customer relationship management actions. CKM skills were found to be in line with customer knowledge quality. Managers should increase the organization's capability in collection, analyzing and utilizing customer knowledge as well as understanding the bigger picture on top of these activities. This can be done by hiring and training employees about master data management, customer analytics and data-oriented marketing.

It is essential for managers to understand that customer knowledge management is not only an issue that customer facing units face, but wider strategically as well as financially important concept. Customer orientated markets and demand for tailored customer experiences will most likely lead the companies into a situation where identification of the most profitable customers and their needs will be the most valuable information when making new business decisions. Turning customer data into understandable information, then knowledge and finally successful action, is a key component of any customer oriented, digitally driven company willing to exist in the future. Traditional service industries like electricity providers and operators, whose customer base is highly heterogenous, will need to identify the customer relationships that generate sales and decrease investments in those segments that don't. To succeed in this, companies need to see customer knowledge management as a process of the whole organization and engage employees in creation, modification and utilization of this knowledge.

7.6. Limitations and future directions

This study had limitations especially in terms of data collection which did not generate enough answers for statistically reliable empirical analysis. Research was also limited to one level of the organization where the knowledge is processed and therefore managerial design of customer knowledge strategy or customer perspective is not taken in consideration. Legal aspects were also left out of the study including GDPR legislation and data privacy (European commission 2020). Also, the practical process steps of customer knowledge management were not covered, as it was more essential to define the output of that process for quantitative measuring.

With its findings and limitations, this study inspires multiple new ways of research in the field of customer knowledge management. First of all, study could be repeated with improvements. As this thesis was first of its kind covering the enablers, process and outcomes of customer knowledge management in B2C markets, the results should be confirmed with confirmatory research in different geographical areas and research settings. In order to get a better representation of the target group, similar research could be replicated with a different data collection methodology, for example with phone interviews or personally sent questionnaire. In addition, more detailed background data of the organizations could give an opportunity to test and compare the relevance of other significant factors like age of the company or digitalization level of the industry. Data analysis could also be executed with more advanced methodology like Confirmatory Factor Analysis (CFA) and Structural Equation Modelling (SME).

Secondly, new research could be made with different variations and adjustments of the created explicit customer knowledge management framework in B2C markets (Figure 13). Explicit customer knowledge management enablers should be studied in more detail and evolve the measurement scales used in this study to be more precise in local and international settings. Similar research framework could also be tested with different outcome results. These could be for example customer performance or financial performance or market value. This would give more holistic understanding if customer knowledge quality has additional benefits for the organization.

Thirdly, new research could also seek to address the “know why” level of data, information and knowledge pyramid of Zeleny (1987). This, also called wisdom level, received little attention in the study the interested was focused on explicit knowledge. In customer knowledge context, “know why” could be considered as the qualitative understanding about motivations and behind consumer actions. Tacit knowledge regarding why some knowledge works for the benefit of the organization would give deeper understanding of the complex process of customer knowledge management. Interesting point of views could be found for example from service design and behavioral science literature. Deeper understand why these different enablers work or don’t work as facilitators in organizations as well as why customer knowledge enhances competitive advantage inspires topics for qualitative studies. One way to investigate this topic could be qualitative approach with research questions covering less studied enablers.

Fourthly, out of customer data governance and master data management are topics that deserve further investigation. Interesting research could be conducted regarding status of data management between different countries and industries as well as success and risk factors of data transformations. As academics and managers lack understanding on long term costs of badly organized or low-quality data, both qualitative and quantitative research should be conducted to further understand this topic.

Finally, interesting approach for a new research could be to widen the topic customer knowledge management to cover all types of organizational data. As stated previously, organizations are not as good with data-oriented decision making as they would like to be (Davenport and Bean 2018). As explicit knowledge created by artificial intelligence gains more managerial interest in facilitating business processes and decision making, the quality of received information becomes more and more significant. It is important that organizational research digs deeper into technological and data management details to provide information for managers.

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APPENDIX 1. List of survey questions

Item	Source
CKS1. Our management considers customer knowledge as a strategically valuable asset	Khosravi et al. (2018)
CKS2. Our company has established clear business objectives for the management of customer-related knowledge	
CKS3. Our management considers customer knowledge quality as a top priority	
BP1. Our business processes are designed to support sufficient collection, analyzing and usage of customer-related knowledge	New scale adapted from Ofner et al. (2012), Ofner et al (2016)
BP2. Customer-related knowledge created from our business processes is mostly errorless	
BP3. Our processes are constantly developed to ensure high quality knowledge generation and usage	
CU1. Our company has a strong customer-oriented mindset	Schmiedel et al. (2013)
CU2. The atmosphere of our company encourages employees to teamwork and cross-functional co-operation	
CU3. We are committed to our processes	
CU4. We share a common thrive for excellence	
CRM1. Our operative customer relationship technologies (eg. CRM, marketing automation, customer service tools ect.) are modern and suit our purposes	Gebert et al. (2003)
CRM2. Our analytical customer relationship technologies (eg. reporting, recommendation engines and prediction tools) are modern and suit our purposes.	
CRM3. Our collaborative customer relationship technologies (eg. customer data repository and contract archive) are modern and suit our purposes.	
ICV1. We have a 360 view to each of our customer	New scale adapted from Khosravi et al. 2018
ICV2. Customer knowledge generated by different units and departments is stored to a common data warehouse	
ICV3. Changes in key customer knowledge (eg. updated address or phone number) is automatically updated across our organization through system integrations	
CDG1. Our organization has a clear view on where, when and how customer data is generated, updated, viewed and deleted in our organization.	New scale adapted from Khosravi et al. (2018) + Davenport and Prusak (1998)
CDG2. Our organization has determined guidelines and goals to manage customer data quality	
CDG3. Our organization has specific employees responsible for data governance activities of each business unit	
CKC1. In our organization, employees have sufficient skills to organize and manage the quality of customer data	Khosravi et al. 2018
CKC. In our organization, employees have sufficient skills to turn customer data to advanced information with analytical methods	
CKC. In our organization, employees have sufficient skills to utilize the customer data in customer relationship management tasks	
CKQ1. The knowledge that we have about our customers is accurate	Ballou and Tayi (1999)
CKQ2. The knowledge that we have about our customers is up to date	
CKQ3. The knowledge that we have about our customers is consistent	
CKQ4. We have enough knowledge about our customers for our needs	
CKQ5. The knowledge that we have about our customers it fit for use	
CA1. We have gained strategic advantage over our competitors	Schilke (2014)
CA2. We have a large market share	
CA3. Overall, we are more successful than our major competitors	

CKS = Customer knowledge strategy
BP = Knowledge oriented business processes
CU = Supportive culture
CRM = Customer relationship management technology
ICV = Integrated customer view
CDG = Customer data governance
CKC = Customer knowledge management competence
CKQ = Customer knowledge quality
CA = Competitive advantage