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The evolving role of customer focus in quality management:

Using customer feedback to mobilize quality improvements in the age of digitalization and increased service delivery

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ABSTRACT

Understanding customer needs is fundamental for being able to deliver high quality products and services, and, as a result, maintain and improve customer satisfaction. Achieving this has become a challenge, as rapid technological developments, market saturation, and increasingly skilled competition from low-cost economies have led to progressively more complex customer needs. In addition, more manufacturing firms are offering services, thus shifting the focus from merely providing a physical product to also providing services. These changes result in an array of challenges for quality management regarding how to manage the integrated duality of product and service quality. Consequently, the need for quality management to understand how customers perceive the quality of the firm's offering is becoming increasingly important, as merely focusing on technical product quality improvements is insufficient. Compiling five papers, based on four studies across both manufacturing and service industries, this thesis outlines the evolving role of quality management in the age of digitalization and increased service delivery, by exploring the use of customer feedback for quality improvements in both products and services.

First, the thesis identifies the *prerequisites* needed to use customer feedback for quality improvements, identifying the importance of access to the different interfaces through which customer feedback emerges. These interfaces are growing in number and complexity as digitalization and increased service delivery reshape how firms and customers interact and how offerings are delivered. Second, the *capacities* needed to mobilize customer feedback for quality improvements are explored using the concept of absorptive capacity, which describes the capacity to acquire and use external information. The studied firms are found to have underdeveloped absorptive capacity in terms of mobilizing customer feedback regarding service quality compared to mobilizing customer feedback on product quality. Third, the evolving *boundaries and scope* of quality management, driven by digitalization and increased service delivery, require quality management to go from reactive and inward-focused to embracing a proactive, continuous, and customer-focused way of working. Furthermore, the abundance of codified customer feedback in the form of big data readily available for firms today, leads to the risk of predominantly focusing on technical quality aspects while neglecting more intangible quality elements. The importance of integrating small data into firm efforts to manage quality is therefore key to ensuring quality improvements encompass the entire customer experience. Conclusively, the evolving role of customer focus in quality management requires the reconceptualization of quality to *quality-in-use*, and the development of both the capturing and the converting roles of quality management in terms of mobilizing customer feedback for both quality improvements and increased customer knowledge.

Keywords: customer feedback, quality management, quality improvements, small data, digitalization, manufacturing, service improvements, customer focus

List of appended papers

Paper 1
Birch-Jensen, A., Gremyr, I., & Halldórsson, Á. (2020). Digitally connected services: Improvements through customer-initiated feedback. *European Management Journal*, *38*(5), 814-825.

Contributions: Birch-Jensen initiated and designed the study and was responsible for the majority of the data collection. The data analysis was led by Birch-Jensen, with support and guidance by Gremyr and Halldórsson, while the writing process was a joint effort of the authors.

Paper 2
Birch-Jensen, A., Gremyr, I., Hallencreutz, J., & Rönnbäck, Å. (2020). Use of customer satisfaction measurements to drive improvements. *Total Quality Management & Business Excellence*, *31*(5-6), 569–582.

Contributions: Birch-Jensen, Gremyr, and Hallencreutz jointly designed the study. The data collection was shared by Birch-Jensen and Rönnbäck, with the aid of Hallencreutz. The data analysis was led by Birch-Jensen with support from Gremyr, and the paper was written jointly by Birch-Jensen and Gremyr.

Paper 3
Birch-Jensen, A., Gremyr, I., & Halldórsson, Á. (2020). Absorptive capacity as an enabler for service improvement: The role of customer satisfaction information. *Total Quality Management & Business Excellence*, 1–15.

Contributions: The paper was initiated jointly by the authors. Birch-Jensen led the data collection, while the data analysis and writing of the paper were a joint effort of Birch-Jensen, Gremyr, and Halldórsson.

Paper 4
Birch-Jensen, A., Gremyr, I., Kumar, M., & Löfberg, N. Absorbing customer feedback for quality improvements of products and services.
Conference paper. Accepted for presentation at EUROMA 2020.

Contributions: The paper was initiated by Birch-Jensen. Gremyr and Kumar aided in identifying respondents in Sweden and the UK, and Birch-Jensen was responsible for the data collection. The data analysis was led by Birch-Jensen, with support from Gremyr and feedback from Kumar and Löfberg. The writing of the paper was a joint effort.

Paper 5
Elg, M., Birch-Jensen, A., Gremyr, I., Martin, J., & Melin, U. (2020). Digitalisation and quality management: Problems and prospects. *Production Planning & Control*, 1–14.

Contributions: Elg initiated the paper and designed the study together with Birch-Jensen, Gremyr, and Martin. Birch-Jensen, Elg, and Gremyr contributed to the data collection, which was led by Martin. The data analysis and the writing of the paper were done jointly by the authors.

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Andrea Birch-Jensen

Stockholm, October 31st, 2020

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1 Introduction

> "…it's making sure you've got the bandwidth to keep up with everybody's small needs, as well as their big ones. You always hit the big ones, but in terms of customer satisfaction, sometimes it's the little things that irritate people. And I think it's that step. Because we're a technology industry, full of technologies and engineers, sometimes we don't actually think about people's feelings." [Quality manager, manufacturing firm, UK]

Increasing and sustaining customer satisfaction by understanding customer needs is a vital practice for many firms that wish to remain competitive (Hallencreutz & Parmler, 2019). This practice is often attributed to having a *customer focus*, which can be defined as "the establishment of links between customer needs and satisfaction and internal processes" (Sousa, 2003, p. 2). Using customer feedback as a basis for quality improvements is thus one means of being customer focused and increasing customer satisfaction (Fundin & Elg, 2006; Lervik Olsen, Witell, & Gustafsson, 2014). At the same time, customer needs are becoming increasingly complex (Lenka, Parida, & Wincent, 2017), which, matched with saturated markets, rapid technological development, and competition from low-cost economies, makes understanding and satisfying customers even more urgent. As a result, many firms strive to acquire and use as much information as possible to be able to deliver high quality products and services that satisfy their customers' needs (Hyun Park, Seon Shin, Hyun Park, & Lee, 2017). Developing absorptive capacity (Zahra & George, 2002)—the capacity to acquire customer information and turn the information into knowledge and quality improvements—is thus key for firms that aim to be customer focused.

What constitutes "quality" today, however, is challenged by several ongoing developments. First, many industries are moving from merely offering products to offering services or customized outcomes in addition to or instead of physical products (Baines & Lightfoot, 2014). This results in increased subjectivity in terms of defining quality, as the customer holds the power to assess the offering's perceived quality (Weckenmann, Akkasoglu, & Werner, 2015). Second, evolving digital technologies are used as a means of responding to increasing demands for personalized offerings (Sader, Husti, & Daróczi, 2019), resulting in sophisticated product and/or service offerings. This imposes new demands on the practices and tools used to manage quality and requires new competencies related to areas such as software engineering and big data analytics (Hyun Park et al., 2017). Digital advancements, often referred to as digitalization,

have also resulted in the potential to perform quality improvements remotely (Porter & Heppelmann, 2014). Thus, the quality of a digital product or service can and is often expected to improve during customer use, as firms have the potential to personalize an offering through remote software updates based on data from both individual and aggregated customer use (Hyun Park et al., 2017). This contrasts with how quality has been traditionally viewed as deteriorating with use, depicting the customer as the value destructor and the company as the sole value creator (Grönroos & Voima, 2013). Working with quality improvements falls under the umbrella of quality management (QM), which is a management philosophy built on principles, such as customer focus, that are operationalized through practices like collecting information and using tools such as an Ishikawa diagram (Dean & Bowen, 1994; Hellsten & Klefsjö, 2000). Originally, firms' work with QM was focused on reducing variations in production processes and ensuring that the product conformed to specifications by conducting quality inspections (Fisher & Nair, 2009). Today, however, the role of QM needs to evolve to focus on enhancing value for the customer, rather than conforming to specifications (Wen, Sun, & Yan, 2020), which puts the spotlight on QM practices that transcend the customer-firm boundary, and allow for acquiring, analyzing, and acting on customer feedback.

Acquiring, analyzing, and acting on feedback regarding product quality, such as data and information about the product's condition and warranty statistics, have always been key elements of QM (Sony, Antony, & Douglas, 2020). As firms are increasingly offering digital products and services, the data readily available for firms has proliferated (McAfee, Brynjolfsson, Davenport, Patil, & Barton, 2012). Combined with increasingly sophisticated digital data analytics tools (Chen, Chiang, & Storey, 2012), the instantaneous and abundant feedback channeled back to providers from the use phase of digital products and services gives the QM function the potential to conduct predictive maintenance, perform real-time quality improvements, and improve its understanding of how customers use the products and services provided (Lee, Lee, & Kim, 2019; Sony et al., 2020). Many firms are, however, struggling to make sense of the abundance of codified feedback, such as big data, generated by the use of digital products and services (Günther, Mehrizi, Huysman, & Feldberg, 2017; Huberty, 2015), resulting in a difficulty to ensure that the customers' perception of quality is accurately understood by the firm. Small data, however, such as customer feedback generated in the meeting between employee and customer (Lam, Sleep, Hennig-Thurau, Sridhar, & Saboo, 2017), can prove valuable in terms of acquiring rich, contextual customer data (Xu, Nash, &

Whitmarsh, 2020), which can aid in providing an understanding of customers' quality perceptions.

Conclusively, in order to maintain and increase customer satisfaction in these times of increased service delivery and digitalization, firms' work with QM must involve an enhanced understanding of customer needs and their perceptions of quality. To accomplish this, QM needs to be positioned in a manner that (1) facilitates acquiring different types of customer feedback, (2) possesses the capacity to use the customer feedback acquired for quality improvements, and (3) is present throughout customers' use of the offering to manage *quality-in-use*. Thus, QM transcends organizational boundaries, as being close to customers during their actual use of a product or service becomes a vital component for QM. Research on QM's role, however, suggests that it has not adapted to the changes described, as QM work remains predominantly focused internally on operations (Martin, Elg, & Gremyr, 2019). Further research on how QM's role is evolving is predominantly focused on how QM can scale up existing practices through digital technologies to, for example, adapt to industry 4.0 (Hyun Park et al., 2017). However, there is limited research on how QM's role is evolving due to changes in value propositions resulting from increased (digital) service offerings. Therefore, this thesis extends the moderate amount of existing research on how QM can adapt to ongoing developments by exploring how customer feedback can mobilize quality improvements at a time when increased competition, market saturation, and complex customer demands challenge firms' ability to manage and improve the quality of their offering to increase customer satisfaction (Weckenmann et al., 2015). To further this understanding, the thesis focuses on integrating two key areas—the *evolving role of quality management (QM)* and *use of customer feedback*—at a time when many firms provide an integrated combination of products and services, both analog and digital (Kohtamäki, Parida, Patel, & Gebauer, 2020) (see Figure 1).

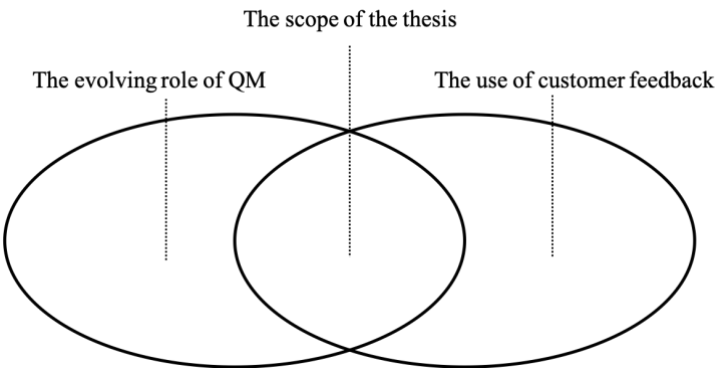

Figure 1: The thesis positioning in terms of QM's evolving role and the use of customer feedback

1.1 Purpose and research questions

A central principle of QM is customer focus (Bergman & Klefsjö, 2010; Lengnick-Hall, 1996; Sousa, 2003), but the first question to be answered is: who is the customer? There may be many answers; the customer may be the end-user, internal customer, consumer, purchasing organization, and even society as a whole (Siva et al., 2016). In this thesis, the term "customer" refers to either the firm purchasing the offering in a business-to-business (B2B) setting and/or the end-user of the offering in a business-to-consumer (B2C) setting. Thus, the term "customer" is used to describe the actor who uses the offering and, as a result, forms a perception of the offering's quality.

Customer focus implies the ability to take customers' viewpoints into account to increase the organization's understanding of its customers, managing the quality of an offering as it is being used by the customer, and facilitating quality improvements for both current and future product and service offerings (Sousa, 2003). At a time when customer feedback is escalating in magnitude due to the sensor data and digital information channeled from digital products, services, and processes (McAfee et al., 2012), organizations face an increasingly complex array of customer feedback sources. The abundance of customer feedback readily available to organizations holds the potential to support their work with quality management and improvements while simultaneously yielding several challenges (Huberty, 2015). As offerings delivered to customers by many industries are becoming more complex due to either technological developments and/or increased service delivery, the importance of customer focus and understanding how customers perceive an offering's quality is growing both more complex and increasingly important. With big data, the main challenge many firms face today is not primarily access to customer feedback, but rather understanding how to navigate the abundance of customer feedback to mobilize quality improvements. In this thesis, QM is conceptually understood as the principles, practices, and tools employed in firms' work to manage the quality of their offerings (Sousa & Voss, 2002). Firms' work with quality improvements is considered one element of QM. Given this background, the purpose of this thesis is:

> *to increase understanding of how the role of QM is evolving by exploring the use of customer feedback for quality improvements in both products and services.*

As digitalization and increased service delivery continue to drive change throughout industries, affecting matters ranging from *what* is being delivered to *how* it is delivered, altering firms' internal processes and their relationships with customers, suppliers, and competitors alike (Porter & Heppelmann, 2014, 2015; Baines & Lightfoot, 2014), the fundaments of QM are not exempt from change (Hyun Park et al., 2017). The understanding of QM's evolving role can thus be increased by exploring how QM's boundaries and scope are evolving as a response to these changes. QM's boundaries are defined in this thesis as where QM operates in terms of both operational and strategic position, distinguishing between the provider, joint, and customer spheres (Grönroos & Voima, 2013). Historically, QM's boundaries have been predominantly in the provider sphere with limited reach into the joint and customer spheres, the primary exception being the need to address a quality failure (Weckenmann et al., 2015). The scope of QM concerns which activities and responsibilities lie within QM's work. Historically, data-driven methods for reducing variations in production processes and the responsibility for continuously improving product quality have been two key responsibilities within QM's scope (Dahlgaard-Park, 2011).

The purpose of the thesis is fulfilled by answering two research questions. To increase understanding of how customer feedback can be used by organizations to enable quality improvements, the first research question aims at identifying *what*: the prerequisites organizations need for this to occur.

RQ1. What are the prerequisites for using customer feedback to enable quality improvements?

In this thesis, customer feedback refers to any feedback, data, information, or performance measurements that relay information about customers' experiences and perceptions of offering quality. This includes information, such as big data, about the offering's use (McAfee et al., 2012) and customer feedback received through a human or digital interface, such as customer calls to customer service or visits to a dealer (Lam et al., 2017), as well as customers' online interactions with firms, for example, through social media forums (Kargaran, Pour, & Moeini, 2017). Furthermore, aggregated measures such as customer satisfaction information (Lervik Olsen et al., 2014; Morgan, Anderson, & Mittal, 2005) are included in the term customer feedback. Moving from a focus on the *what*, that is, the structural elements comprising the prerequisites needed to use customer feedback for quality improvements, to a focus on *how* to manage within those structural elements, the second research question aims to explore *how*

firms use customer feedback for quality improvements. Given the research purpose and context of exploring the use of customer feedback to mobilize quality improvements, to understand the sought after "how," this thesis uses the concept of absorptive capacity (Zahra & George, 2002, Cohen & Levinthal, 1990), which describes the capacity to acquire and use external information. Thus, while RQ1 identifies the prerequisites—the *what* in terms of the structural elements and requirements needed for firms to use customer feedback for quality improvements—RQ2 addresses *how* to manage these prerequisites to actually use customer feedback.

RQ2. How can using customer feedback mobilize quality improvements?

Consequently, while RQ1 identifies the structural elements needed to use customer feedback for quality improvements, RQ2 explores the muscles—the absorptive capacity—QM needs to put these prerequisites to use. By exploring these two dimensions, the understanding of QM's boundaries and scope is increased in terms of how it is impacted by the prerequisites and absorptive capacity needed to use customer feedback in an age of digitalization and increased service delivery. Based on establishing QM's changing boundaries and scope, this thesis proposes and discusses its evolving role.

2 Frame of reference

This chapter presents the literature and theoretical perspectives connected to the thesis' purpose and research questions. The first part of the chapter concerns the concept and evolving role of QM, as the purpose of the thesis is to increase understanding of how QM's role is evolving by exploring the use of customer feedback for quality improvements in both products and services. The second part of the chapter then outlines different types of customer feedback and the associated processes for using it; this knowledge is necessary to understand the prerequisites needed for using customer feedback to enable quality improvements (RQ1). Following that, using customer feedback to mobilize quality improvements is explored (RQ2). The concept of absorptive capacity (ACAP) is chosen to aid in explaining how customer feedback can *mobilize* quality improvements, as ACAP specifically entails the capacity to transform external information into new knowledge and improvements (Zahra & George, 2002). Together, these building blocks within the chapter aid in analyzing QM's evolving role. Last, a synthesis of the chapter is presented. The conceptual framework shown in Figure 2 provides a visual overview of the concepts introduced in the chapter.

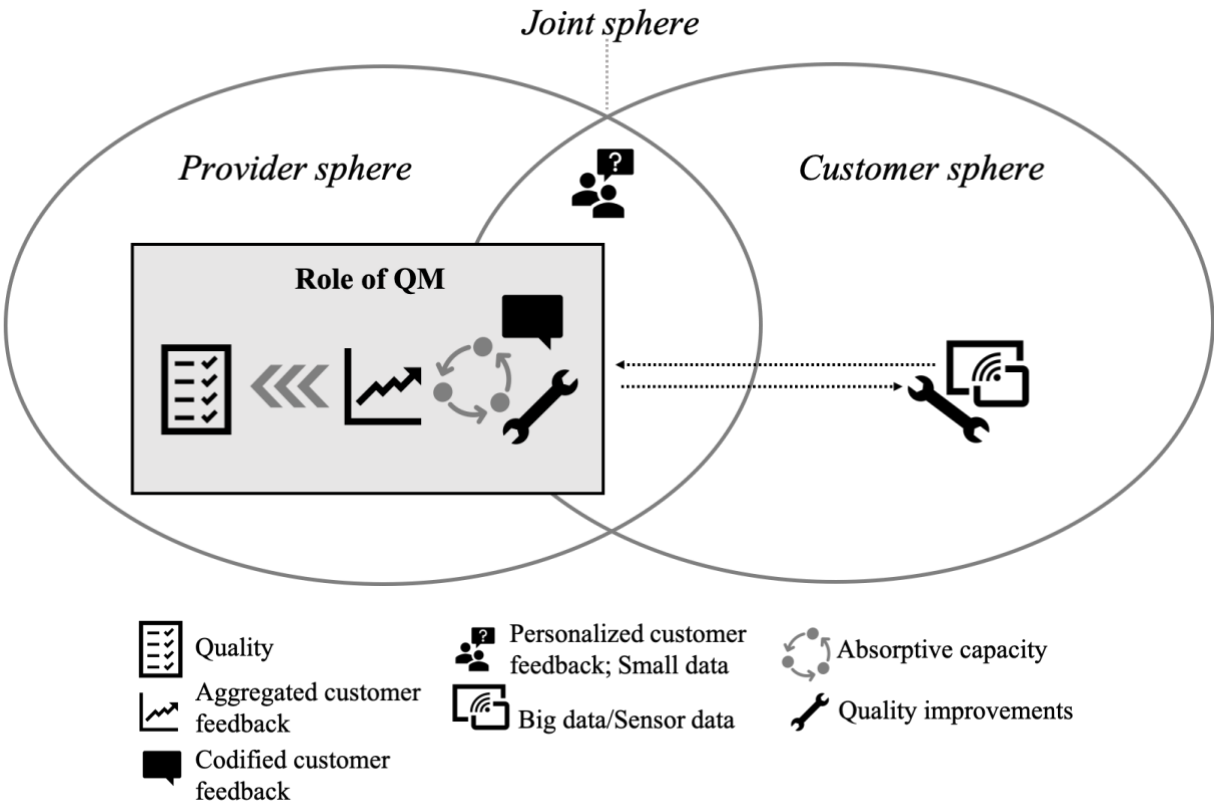

Figure 2: Conceptual framework

2.1 The evolving role of quality management

To understand QM's evolving role, it is first necessary to understand its origin and roots and how its role has developed throughout the years.

2.1.1 The traditional role of quality management: Roots and developments

Dedicated work with QM in manufacturing industries is a well-established practice, with roots dating back to the industrial revolution in the late 19th century in Europe and the US (Fisher & Nair, 2009). During the industrialization of factories, the role of what we today refer to as QM was primarily to inspect products to ensure their quality (Wen et al., 2020). Quality as a concept itself related solely to product quality and referred to delivering a product that met customer requirements (Fisher & Nair, 2009). As QM stems from manufacturing industries, working with product quality and production efficiency has been the key focus, operationalized through an array of statistical and data-driven methods and tools, such as statistical quality control (Dahlgaard-Park, 2011). Organizing employees to work with managing and improving quality led to the development of a specialized QM function, which is an integral organizational role in today's manufacturing firms (Gremyr, Elg, Hellström, Martin, & Witell, 2019). It attained a solidified position as an independent organizational function before developing into a holistic management approach in the 1970s (Weckenmann et al., 2015).

The modern QM approach originated in Japan in the late 1970s, where QM's traditionally predominant focus on statistical methods was complemented with managerial know-how, emphasizing that a statistical quality control method "can only fulfill its purpose when supported by a broad 'Quality management' culture and approach, led by top management and informing the totality of enterprise activity" (Fisher & Nair, 2009, p. 8). Following this, QM has been considered a management philosophy built on principles, which in turn are operationalized through its practices and tools (Dean & Bowen, 1994). Customer focus has been argued as QM's primary principle, followed by the principles of continuous improvement, teamwork, leadership commitment, evidence-based decision making, process focus, and people engagement (Bergman & Klefsjö, 2010; Dean & Bowen, 1994). The need for firms to align, and integrate, their overall work with customer focus to their work with QM also started to gain attention in the late 20th century (Lengnick-Hall, 1996). Furthermore, QM development in Japan generated a number of QM practices and tools that are today well-known, such as the Ishikawa diagram, 5S, kaizen, six sigma, and lean production (Dahlgaard-Park, 2011; Wen et al., 2020). Since the early 21st century, the broader management aspects of QM have begun to

develop further, involving concepts such as customer engagement and sustainability (Abbas, 2020), which call for a more holistic and organization-wide approach to work with QM, extending beyond firm boundaries. This development is further driven by digitalization (Sony et al., 2020) and increased service delivery (Wen et al., 2020), posing the question of how QM's main principles, such as *customer focus*, are operationalized in firms today.

2.1.2 The role of quality management in an age of digitalization and servitization

In today's environment of digitalization and increased service delivery, like other organizational functions and entire industries (Porter & Heppelmann, 2014, 2015), QM's role involves new requirements, challenges, and opportunities (Wen et al., 2020; Sony et al., 2020; Lee et al., 2019; Hyun Park et al., 2017). One of today's main challenges for QM is developing both an understanding of and processes for working with *perceived quality*, since customer perceptions of an offering's quality may not be the same as those of the firm (Weckenmann et al., 2015; Wen et al., 2020). In this thesis, perceived quality is conceptualized in line with Grönroos's (1984) proposed model as the combination of *technical* and *functional* quality. The technical quality aspects deal with the offering's outcome, answering the question *What was delivered?*, while the functional quality aspects deal with the delivery process, answering the question *How was it delivered?*, considering, among other things, the surrounding processes, behaviors, and timeliness of the delivery (Grönroos, 1984). Thus, one could argue that technical quality aspects are fairly easily quantified and specified and can be translated into the tangible product quality specifications that manufacturing firms are skilled at working with. In contrast, the functional quality aspects lie firmly in the service quality domain and involve intangible aspects to a much larger extent.

As a response to the challenges above, the concept of quality is evolving from something that is "inspected and controlled by the producing enterprise" (Weckenmann et al., 2015, p. 289) to instead encouraging a view that can incorporate subjective quality perceptions (Wen et al., 2020). This shift also involves developing the type of work done and competencies needed by QM practitioners: "the role of quality professionals will evolve so that they are partners, data scientists, and *value creators, not only technical specialists* [emphasis added]" (Wen et al., 2020, p. 14). It appears, however, that QM practitioners remain predominantly inward-focused in their work, lacking some of the knowledge and skills needed to develop an increasingly external and customer focused perspective (Martin et al., 2019). This underlines the importance of QM's development of processes and capacities that consider customer perceptions and

experiences in the form of customer feedback to mobilize quality improvements. For QM to acquire an external, customer-focused perspective on quality, understanding its role in the value creation process (Grönroos & Voima, 2013) is key. The value creation process as described by Grönroos and Voima (2013) stresses that the customer creates value from the offering through *value-in-use*, which is closely linked to service quality (Medberg & Grönroos, 2020). Adopting the value creation process puts the provider firm in the role of either a (1) value facilitator or (2) value co-creator by interacting with the customer in the customer's value creation process. The notion that the customer is a co-creator of value has also been put forth in QM literature (e.g. by Lengnick-Hall, 1996, describing customers as co-producers of quality). The value creation process can be represented by three different spheres: the provider (where value facilitation occurs), joint (where value co-creation occurs), and customer spheres (where the customer creates value) (Grönroos & Voima, 2013).

Furthermore, as many manufacturing firms offer services in addition to or instead of the physical product (Baines & Lightfoot, 2014), such as digitally connected services (DCS) (Porter & Heppelmann, 2014) or sell a certain performance or outcome instead of physical product ownership (Song & Sakao, 2017; Beuren, Ferreira, & Miguel, 2013), firms' QM work needs to improve an offering's technical aspects while also ensuring delivery of a high-quality service. Furthermore, with increased service delivery comes increased subjectivity in terms of how customers perceive quality (Medberg & Grönroos, 2020). Successful QM is proposed as a combination of approaches, where the system's technical, organizational, and social aspects are configured in a way that allows organizations to have holistic and multidimensional approaches to their QM work (Zeng, Phan, & Matsui, 2015).

2.2 Using customer feedback for improvements

The term *customer feedback* is used in this thesis as encompassing any data or information that concerns the customer's perceived quality of the offering. Examples of customer feedback include sensor data automatically transmitted during the use of a digital product or service, or big data (McAfee & Brynjolfsson, 2012); information gathered by frontline employees (FLEs) in their interactions with customers, an example of small data (Lam et al., 2017); and customer satisfaction information (CSI) in the form of aggregated customer satisfaction measurements (Lervik Olsen et al., 2014; Morgan et al., 2005).

2.2.1 Customer feedback processes

Customer feedback processes can be either systematic and structured, entailing standardized processes for capturing and transmitting customer feedback throughout the firm, or informal and unstructured (Fundin & Elg, 2006). Further, customer feedback processes can be categorized in terms of (1) how the feedback was gathered and (2) the feedback's format (Fundin & Elg, 2006). In terms of the former, gathering feedback can be either active or passive (Sampson, 1999). Active feedback processes refer to those that actively solicit customer feedback, such as customer surveys (Fundin & Elg, 2006). By contrast, passive feedback processes do not involve actively encouraging customers to provide feedback and can be exemplified by customer calls to a customer service function.

The feedback format can be either codified or personalized, where the former refers to customer feedback generated and transmitted in computerized systems (Fundin & Elg, 2006). By contrast, personalized customer feedback processes deal with information transmitted between people, such as through service personnel who receive customer feedback and thus become knowledge carriers within the organization. Examples of customer feedback processes that combine active and codified customer feedback include warning systems, automatically transmitted data during use of a digital service, and designated tests of the same. Using big data (McAfee et al., 2012), is therefore—based on the classification presented by Fundin and Elg (2006; 2010)—handled by processes dedicated to the combination of active and codified customer feedback. An example of acquiring active and personalized customer feedback is a consumer lab, where customers are invited to try out new products and services while providing feedback on their experience to the product development team at the site. Passive and codified customer feedback processes deal with, for example, the emerging phenomenon of social media feedback, where customers voice their opinions regarding a firm's products or services on social media (Abrahams, Jiao, Wang, & Fan, 2012), and traditional complaint systems through the firm's website. Finally, passive and personalized customer feedback processes entail the traditional customer service function, where customers can call in to voice complaints or ask questions. Here, customer service function personnel often become knowledge carriers of customer information (Fundin & Elg, 2006).

Conclusively, customer feedback processes can be used for both reactive and proactive quality improvements. Traditionally, customer feedback processes used in QM work have largely dealt with reactive quality improvements, receiving customer feedback once a product quality issue

has occurred (Ruessmann et al., 2020). However, this is changing due to the emergence of real-time in-use data (i.e., big data) (Davenport, Barth, & Bean, 2012). Furthermore, increased service delivery requires that QM work also incorporates customer feedback on subjective quality perceptions (Weckenmann et al., 2015), which can take the form of small data (Lam et al., 2017) or customer satisfaction information (Hallencreutz & Parmler, 2019). This thesis explores using different categories of customer feedback for quality improvements: big data (i.e., *"in-use data*," sensor data), small data (i.e., customer feedback actively or passively received by frontline employees), and aggregated customer feedback (e.g., aggregated customer satisfaction information or warranty statistics).

2.2.2 Different types of customer feedback: big, small, and aggregated

Big data promises to be a wealth of potential knowledge that can swiftly be translated into improvement actions and thus result in improved organizational performance (McAfee et al., 2012). Understandably, the "big data revolution" has gained substantial attention from both researchers and practitioners (Cohen, 2018; Clarke, 2016; Chen & Zhang, 2014; McAfee et al., 2012). The potential for and accessibility of big data has resulted in the need for new competencies, such as data scientists and analysts who possess the skills to develop and utilize sophisticated analytical tools and identify patterns and draw conclusions from the data (Cohen, 2018). Furthermore, as big data transcends many operational functions, these competencies should not be isolated in the IT function, but rather should be spread throughout different organizational functions (Davenport et al., 2012).

In relation to QM, big data has been discussed in terms of both internal and external impact, in other words, improving internal process efficiency by enabling real-time monitoring and diagnostics of production processes (Hyun Park et al., 2017), and nearly instantaneous quality improvements when responding to real-time sensor data from customer usage of digital products and services (Davenport et al., 2012). Big data is also increasingly used as a way to predict quality issues before they occur, which allows the QM function to conduct proactive quality improvements through, for example, predictive maintenance (Lee et al., 2019). QM's ability to utilize big data has been positioned as a vital element for QM to adapt to industry 4.0 (Sony et al., 2020). Hyun Park et al. (2017) further propose the role of QM practitioners as suitable for incorporating the roles of data scientists and analysts, as the role of QM practitioners often entails using analytical and statistical approaches, such as experiment design, six sigma, and statistical process control.

However, big data's full potential is still being revealed, as many firms struggle to use the abundance of codified feedback, thus often reverting to using big data to optimize their existing processes instead of identifying new ways of creating value (Günther et al., 2017; Huberty, 2015). As a response to the challenges experienced by firms aiming to utilize big data for improvements, the concept of *small data* has been suggested as a potential tool to aid firms in navigating in the abundance of codified big data (Lam et al., 2017; Xu et al., 2020). Lam et al. (2017) define small data as "data collected through [employees'] interactions and relationships with customers" (Lam et al., 2017, p. 13), emphasizing the personalized nature of this type of customer feedback. Other researchers differentiate between small and big data based on whether firms can utilize traditional data analysis tools, thus also including codified data, such as social media postings, in their categorization of small data (Xu et al., 2020). A distinction closely linked to categorizing data as "small data" refers to *small data sets*, often entailing qualitative data (Xu et al., 2020). In this thesis, small data are defined as data created through direct interaction between a customer and a firm employee (as per Lam et al.'s (2017) definition), as well as data acquired through a human-digital-human interface, such as social media posts and customer emails that are received or retrieved and analyzed by firm employees rather than data analytics tools.

In terms of aggregated customer feedback, the feedback can either reach the firm in an aggregated format (e.g., when firms purchase aggregated customer satisfaction information) or undergo aggregation in the firm's customer feedback processes (e.g., when the QM function aggregates warranty issues to enable analyzing warranty statistics). However, even though firms commonly acquire aggregated customer satisfaction information, many firms struggle with using customer satisfaction information for quality improvements (Lervik Olsen et al., 2014). In general, many firms' use of customer information is argued to be immature (Rollins, Bellenger, & Johnston, 2012), which is reasoned to be linked to the notion that information regarding the firm's customers is the most complex information the firm handles (Davenport, Harris & Kohli, 2001). Furthermore, firms have been found to use aggregated customer satisfaction information predominantly as a control mechanism, rather than a driver for quality improvements, hemming the firms' potential to increase their customer knowledge (Morgan et al., 2005).

Thus, to mobilize quality improvements using customer feedback, firms must not only possess specific customer feedback processes, but also have the overarching absorptive capacity to acquire, use, and learn from, different types of customer feedback.

2.3 Absorptive capacity: The capacity to absorb external information

In this thesis, the concept of ACAP is chosen to explore how the firms studied value, acquire, assimilate, and use different types of customer feedback to mobilize quality improvements. ACAP has been described as the firm's capacity to evaluate and apply external information (Cohen & Levinthal, 1990). The practice of collecting information has been used in QM literature as a way to fulfill the main principle of being customer focused (Samson & Terziovski, 1999). Furthermore, a number of QM tools such as pareto charts and statistical process control have been developed to aid in analyzing the information and data collected (Dean & Bowen, 1994). Thus, choosing the concept of absorptive capacity to explore using customer feedback to mobilize quality improvements can aid in providing an encompassing understanding ranging from acquisition to the actual transformation of customer feedback in the firms studied, regardless of which QM practices and tools they employ. Other studies have used the concept of absorptive capacity to analyze firm ability to apply external information to further innovation (Cepeda-Carrion, Cegarra-Navarro, & Jimenez-Jimenez, 2012) and product-portfolio decision-making (Mäkinen & Vilkko, 2014). Events that trigger firms to respond to external information, which in the scope of this thesis is customer feedback, are referred to as *activation triggers* (Zahra & George, 2002).

Further, ACAP can be viewed as multidimensional, consisting of both horizontal and vertical dimensions. The horizontal dimension refers to the "dynamic interplay between internal and external environments of the firm" (Martinkenaite & Breunig, 2016, p. 700), while the vertical dimension refers to the interplay between individual employees and the organization. The importance of individual employees in developing the firm's absorptive capacity is central (Cohen & Levinthal, 1990), albeit the vertical link between individual employees and the firm-level absorptive capacity lacks insight, particularly in terms of individual employee-level absorptive capacity (Sjödin, Frishammar, & Thorgren, 2019). In this thesis, ACAP is explored in both the horizontal and vertical dimensions as a way of furthering understanding of how customer feedback can be used to mobilize quality improvements. ACAP's horizontal dimension is explored in terms of the provider, joint, and customer spheres (Grönroos, 2011).

In terms of the vertical dimension, there is a predominant focus on the interplay between the individual (e.g., individual QM or frontline employees) and functional levels (i.e., the QM function's absorptive capacity).

ACAP can also be broken down into potential absorptive capacity (PACAP) and realized absorptive capacity (RACAP) (Zahra & George, 2002). PACAP entails the distinct capacities to *acquire* and *assimilate* external information, while RACAP depicts the capacities to *transform* and *exploit* the information for commercial ends (Camisón & Forés, 2010). PACAP and RACAP are two distinct and complementary capacities, and firms can have a more well-developed PACAP than RACAP or vice versa (Easterby-Smith & Lyles, 2011). For example, a firm can identify a certain type of customer feedback as valuable for the firm's work with quality improvements and acquire it for this purpose, but if this knowledge is not utilized in the firm's QM processes and applied to actual quality improvements, the potential absorptive capacity has not been realized (Mäkinen & Vilkko, 2014). Thus, PACAP represents the potential to use customer feedback for quality improvements, and RACAP represents the actual utilization and application of the acquired customer feedback for quality improvements.

The first step in absorbing external information, such as customer feedback, is to identify and value the information in terms of its importance for things such as understanding customer perceived quality and identifying potential areas for quality improvements. This capacity is attributed to firms' acquisition capacity, which is a distinct sub-capacity of PACAP (Zahra & George, 2002). Once customer feedback has been identified as important and has been acquired, it is necessary to deploy processes through which the feedback can be analyzed, processed, and understood, which is referred to as assimilation capacity (Camisón & Forés, 2010). This requires firms to possess processes that can integrate different types of customer feedback, as these can have different content (Fundin & Elg, 2006), for example, codified, such as digital sensor data, and personalized, such as small data created in interactions between customers and employees (Lam et al., 2017), and different volume, for example, big data, aggregated customer satisfaction information, and individual customer complaints delivered to FLEs. In terms of assimilation, data analytics tools, such as big data analytics, are growing in importance, as these are needed to handle the large data sets stemming from big data (Chen et al., 2012).

Once it has been analyzed and understood, customer feedback needs to be integrated with existing knowledge to improve and develop firm knowledge (Zahra & George, 2002), such as how customers perceive an offering's quality. This is attributed to the transformation capacity (Camisón & Forés, 2010). Thus, organizational learning plays a vital role in developing firms' transformation capacity, as acquiring new information is important, but converting information into organizational knowledge that can then be applied to quality improvements and developing new offerings is key for superior performance (Camisón & Forés, 2010). Nonaka (1994) presented a widely recognized model of how firms learn and create knowledge by portraying how firms develop knowledge through constant interchanges between tacit and explicit knowledge. Tacit knowledge refers to personal knowledge, which is difficult to formalize and communicate, while explicit knowledge refers to codified knowledge, which is easily transmitted through formalized systems (Nonaka, Takeuchi, & Umemoto, 1996). The constant interchange between tacit and explicit knowledge is referred to as knowledge conversion, representing the dynamic nature of organizational knowledge creation (Nonaka et al., 1996). The four types of knowledge conversions are depicted in Figure 3.

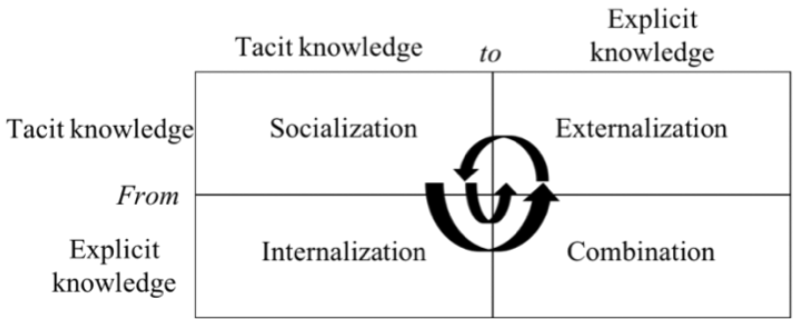

Figure 3: Knowledge conversion modes, as identified by Nonaka, Takeuchi, & Umemoto, 1996

The final capacity within RACAP concerns the capacity to exploit the newly acquired, assimilated, and transformed knowledge by emphasizing application of knowledge (Zahra & George, 2002). The new knowledge is incorporated into the firm's operations in a manner that develops the processes involved in these operations, thus institutionalizing the improvements (Zahra & George, 2002). Exploitation can either lead to improvements in existing operations, processes, and competencies and/or development of new ones (Camisón & Forés, 2010).

2.4 Synthesis

The three earlier sections in this chapter discuss QM's evolving role, using customer feedback for improvements, and absorptive capacity; together, they constitute the components of the conceptual framework visualized in Figure 2.

First, to increase the understanding of QM's evolving role, section 2.1 offers an overview of QM's roots, as these have shaped and formed its role throughout the past. Furthermore, it addresses the contextual elements that influence how firms work with QM, such as digitalization and increased service delivery.

Second, section 2.2 explores the different types of customer feedback to provide a basis for identifying and examining the prerequisites requested in RQ1. The varieties of customer feedback available for firms today also present challenges and opportunities regarding how using customer feedback can mobilize quality improvements (RQ2).

Third, section 2.3 describes the concept of absorptive capacity, which presents a way to explore how firms acquire different types of customer feedback and translate them into quality improvements, thus enabling the research to explore how using customer feedback can mobilize quality improvements (RQ2), as well as identifying the prerequisites needed to do so (RQ1).

3 Research methodology

The research methodology of this thesis aligns with many characteristics in its field of inquiry; it is explorative, dynamic, and emphasizes learning and understanding. This chapter presents the research design of the thesis and how it relates to the chosen empirical context, as well as the research process and methods, and elaborates on the rationale for these choices.

3.1 Research design

To ensure suitability, research design should be guided by the purpose of the research and operationalized through the research questions (Maxwell, 2012). The dynamic phenomenon of QM's evolving role, which is understood in this thesis by exploring the use of customer feedback for quality improvements in both products and services in the context of digitalization and increased service delivery, is far from well defined and has not been exhaustively studied in any particular research field. Rather, the issues connected to the particular phenomenon reside in several different research fields, as well as in the interfaces between these, which in turn calls for collecting rich, empirical data to further the understanding and knowledge of the phenomenon (Edmondson & McManus, 2007). It can therefore be argued that the research is phenomenon-driven, focusing on understanding QM's evolving role, rather than driven by a gap in existing literature (Schwarz & Stensaker, 2014). However, this does not mean there is no gap in existing literature, as the phenomenon lacks a well-developed theoretical foundation. It could therefore be argued that the phenomenon has nascent theoretical underpinnings, thus further implying suitability for a qualitative research strategy (Schwarz & Stensaker, 2014; Edmondson & McManus, 2007). This is illustrated by the purpose and research questions, which concern understanding the evolving phenomenon rather than establishing structures between existing theoretical constructs. Furthermore, since the research questions are open-ended inquiries regarding the phenomenon of interest, collecting qualitative rather than quantitative data is argued to be most suitable (Edmondson & McManus, 2007; Flick, 2014).

Since the purpose of the research is to increase understanding of how the role of QM is evolving by exploring the use of customer feedback for quality improvements in both products and services, understanding employees' perceptions and experiences regarding these matters is of the essence. Because these sources of information—meaning employees' perceptions and experiences—are subjective, a research design that is capable of capturing these subjective and often non-quantifiable viewpoints is called for. Thus, qualitative case studies were deemed the

most suitable, since this allows the research to capture nuances and subjective opinions and facilitates an in-depth understanding of the phenomenon at hand (Flick, 2014).

3.2 The connection between the research questions, studies, and sampling strategy

The purpose of the research is fulfilled through two research questions, which in turn are operationalized in four studies. Of the four studies, three are case studies and one is an interview study. The research questions were informed to different extents by the studies conducted. Figure 4 illustrates the relationship between the research questions, studies, and corresponding papers.

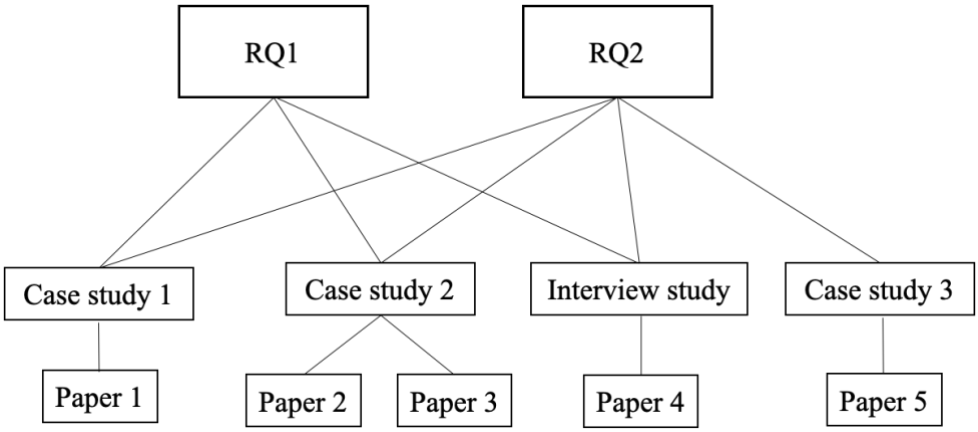

Figure 4: Overview of relationship between research questions, studies, and papers

The research conducted is based on a *purposeful* sampling strategy, which is suitable for "the identification and selection of information-rich cases related to the phenomenon of interest" (Palinkas et al., 2015, p. 533). As the phenomenon of interest is *the evolving role of QM*, which is understood in this thesis by exploring how using customer feedback can mobilize quality improvements in both products and services, the sampling strategy aims to ensure collection of rich data regarding this phenomenon. This has been done by primarily sampling two types of firms: (1) firms that both have dedicated QM practitioners and offer some type of service(s) and (2) firms that enable exploring how a specific type of customer feedback, *aggregated customer satisfaction information*, is used to mobilize quality improvements. Aiming for variation in the sampling enables an analysis which can contrast, compare, and build upon, the different cases, in a manner which extends beyond the local context of the organization in order to enhance analytical generalizability (Miles & Huberman, 1994).

The first type of firm allows exploring how customer feedback in general is used to enable quality improvements and capturing how QM's role is evolving. Focusing on firms with dedicated QM practitioners, which are organized in QM functions in the firms studied, allows for collecting rich data regarding the work of QM practitioners within the scope of the phenomenon studied. The interviewees in the first type were sampled based on their role in their firms' work with QM, thus predominantly entailing QM practitioners that were organized in the QM function. However, to ensure a holistic and encompassing understanding, the sample of interviewees also included employees who were connected to the firms' use of customer feedback for quality improvements, such as FLEs and employees from the IT function. This sampling strategy was used in case study 1, case study 3, and the interview study.

The second type of firm was not sampled based on whether they had dedicated QM practitioners; instead, the criteria was that the firms acquire a specific type of customer feedback (aggregated customer satisfaction information) to facilitate exploring how using a specific type of customer feedback can mobilize quality improvements. This sampling strategy was used in case study 2, which involved 27 service firms in a variety of Swedish service sectors. Focusing the sample on service firms was based on the notion that service firms are more likely to employ a customer-focused strategy (Wang, Zhao, & Voss, 2016), which therefore arguably implies a more mature and further developed approach to using customer feedback. The variety of service sectors represented in the sample were the result of a purposive sampling strategy (Flick, 2014), making it possible to gather insights regarding commonalities and differences between those industries. Together, the two sub-strategies of the sampling strategy allowed for collecting rich data on both the depth and width of the phenomenon.

While case study 1 sets the stage by providing rich insights into using customer feedback to mobilize quality improvements and how QM's role is being influenced by digitalization and increased service delivery, case study 2 provides data regarding how using a specific type of customer feedback can mobilize quality improvements on an organizational level. Thus, both case study 1 and case study 2 provide intra-organizational insights into the prerequisites for using customer feedback to enable quality improvements (RQ1) and increase the understanding of how using customer feedback can mobilize quality improvements (RQ2). Moving from an organizational to a functional perspective, both the interview study and case study 3 predominantly reside within the QM function, focusing on how it uses customer feedback to mobilize quality improvements and studying how the firms' evolving context (i.e.,

digitalization and increased service delivery) is impacting QM's role. The sampling strategy of the interview study aims for a variation in sampling (Miles & Huberman, 1994) within the given context of working with quality management in manufacturing, as this complements the in-depth case study 1 in terms of facilitating a broad understanding of how different quality managers work with the identified issues. Case study 1 and case study 3 also involve practitioners engaged in QM work who reside outside the formalized QM function, which allowed for an outside-in perspective on working with QM. In sum, the studies provide both in-depth understanding and breadth concerning the phenomenon. Thus, even though both research questions were informed by more than one of the studies conducted, the types of insights and data that were used to answer the research questions differed. Table 1 presents an overview of the studies and their key focuses. Further details regarding the case characteristics of each study can be found in the corresponding papers. The connections between the studies conducted and the research questions are displayed in Table 2.

Table 1: Overview of studies, sampling strategy, key focus, and corresponding papers

Study	Study characteristics	Sampling strategy	Key focus	Paper(s)
Case study 1	*Single case *Manufacturing firm *11 interviews[1], two focus groups, non-participant observations	*Firms with a dedicated QM function that include services in their customer offerings	*Using customer feedback to mobilize quality improvements (QM function and FLEs) *The effect of digitalization and increased service delivery on QM work (cross-functional and contextual insights)	Paper 1
Case study 2	*Multiple case *Service firms in different industries *24 firms *1-3 respondents per firm *37 interviews	*Firms that acquire aggregated customer satisfaction information, to allow exploring how a specific type of customer feedback is used to mobilize quality improvements	*Using aggregated customer feedback to mobilize quality improvements (cross-functional insights)	Paper 2, Paper 3
Interview study	*Interview study *Manufacturing firms in different industries *1 respondent per firm (quality manager) *17 interviews	*Firms with a dedicated QM function that include services in their customer offerings	*Using customer feedback to mobilize quality improvements (QM function)	Paper 4

[1]Eight interviews were shared between case study 1 and case study 3, resulting in a total of 90 unique interviews.

Case study 3	*Multiple case *Manufacturing and service firms in different industries *4 firms *33 interviews[1]	*Firms with a dedicated QM function that include services in their customer offerings	*The effect of digitalization on QM work (QM function)	Paper 5

3.3 Data collection

To fulfill the purpose of the thesis and answer the two research questions, data were collected in a total of four studies that predominantly utilized semi-structured interviews. Since the two research questions rely on understanding both the structural elements, that is, the prerequisites for using customer feedback, and the actions and behaviors within and across these structural elements, interviews were deemed the most suitable data collection method, as they allow for acquiring rich contextual insights into the phenomenon (Alvesson, 2003). Additional data collection methods included non-participant observations and focus groups (case study 1). Table 2 displays an overview of the data collected relative to the research questions.

Table 2: Data collection relative to the two research questions

Research question	Data collection method	Purpose of deployed method
RQ1	Semi-structured and unstructured interviews	*Gain insights into functional and cross-functional prerequisites and how these relate to digitalization and increased service delivery
	Non-participant observations	*Gain understanding of spoken and unspoken cross-functional prerequisites in terms of the customer feedback processes involving multiple functions, such as the QM, IT, and marketing functions
	Focus groups	*Aid in identifying and validating prerequisites
RQ2	Semi-structured and unstructured interviews	*Insights regarding the capacities in play, from the cross-functional, functional and individual perspectives, for customer feedback to mobilize quality improvements *Rich contextual insights regarding how digitalization and increased service delivery contribute to QM's evolving role from both the cross-functional and functional perspectives *Insights regarding how quality managers use customer feedback to mobilize quality improvements *Rich contextual insights regarding how digitalization and increased service delivery are evolving QM's role from the perspective of quality managers
	Non-participant observations	*Insights regarding the spoken and unspoken functional and cross-functional capacities in play
	Focus groups	*Aid in exploring and validating capacities

The interviews in all studies were conducted by the researcher and a team of co-researchers, excluding the interview study, where all interviews were conducted by the researcher. In total,

the researcher conducted 34 of the interviews used in this thesis. The interview protocol was developed and tested by the researcher in all studies except case study 3, where the interview protocol was mutually developed with the co-researchers. Examples of interview questions used in the studies can be found in the published papers appended to this thesis (papers 1, 2, 3, and 5). In the interview study, the questions centered around topics such as what types of customer feedback the quality managers receive, which events trigger the quality manager to receive this customer feedback, and how these different types of customer feedback are used in their quality improvement work. Conducting interviews is an active data collection method, where the researcher and interviewee together create knowledge through their relationship (Kvale & Brinkmann, 2009). Interviews also allow the interviewees to reconstruct certain events (Bryman & Bell, 2015), which was valuable for understanding QM's *evolving* role, in terms of how QM work has changed throughout time. The initial interview in case study 1 was unstructured, to allow for the uncovering of themes and issues which were deemed important by the interviewee, while also ensuring the least amount of bias and influence by the researcher (Qu & Dumay, 2011). Employing an unstructured interview in the beginning of the research process can also aid in building rapport with the interviewee (Douglas, 1985), which was useful as the researcher later on observed the interviewee throughout their workday. All other interviews were semi-structured to reduce the influence of any preconceived notions of the researcher, while still allowing for focusing the interviews around a number of chosen themes. The semi-structured format further allows the respondents to, to some extent, provide direction and nuances that lie outside the interview protocol (Qu & Dumay, 2011). Furthermore, the interview questions were open-ended to allow the interviewees to provide content-rich answers (Bryman & Bell, 2015).

The semi-structured nature of the interviews also made it possible to adjust the questions to suit the situation and capture the interviewee's perceptions and experiences (Rowley, 2012). This flexibility allowed the collection of rich data regarding the phenomenon, and follow-up questions could be posed to encourage the interviewees to provide more in-depth information on certain topics. Examples of follow-up questions were asking "Why?" or "Has the process always been this way?" to gain both deep and contextual insight. The interview guides varied between the studies to focus on a certain subdomain of the phenomenon of interest. The interviews were conducted face-to-face, with the exception of some in the interview study that were conducted by phone or Skype. As interviews build on a relational process of information sharing (Kvale & Brinkmann, 2009), face-to-face interviews are preferred. However, because

the researcher and interviewee were in different countries for some of the interviews in the interview study, other methods had to be used. After receiving the interviewees' permission, all interviews were recorded and subsequently transcribed to facilitate comprehensive data analysis.

To be able to respond to the two research questions, different types of interviewees were chosen. All interviewees were in some way involved in working with quality improvements in their firm's offerings; however, not all of them resided in a dedicated QM function (instead residing, for example, in the IT or customer service function). This cross-functional span of interviewees facilitated generating insights into cross-functional processes and actions, enabling identification of the prerequisites for using customer feedback to enable quality improvements (RQ1) and how the customer feedback is used to mobilize quality improvements (RQ2) in an organizational context, rather than in an isolated functional context. All interviewees have managerial duties of some sort, ranging from middle management to the C-suite. This facilitated collecting rich data because all interviewees have a relatively broad understanding of their own processes and actions and an understanding of how their work fits into the broader scheme of the organization. In case study 1 and case study 3, semi-structured interviews were held with employees from several different functions to gain broad insights into the effect of digitalization and increased service delivery on QM work. These interviews further aided in understanding the cross-functional aspects of working with quality improvements and QM. In case study 2, the interviewees were all senior managers from a variety of functions who were involved in using customer feedback (in this study, aggregated customer satisfaction information), again making it possible to analyze use of customer feedback from a cross-functional perspective. In the interview study, the interviewees were all quality managers in their respective firms, providing rich insights into how quality managers work with different types of customer feedback and their experience in how their work with QM is influenced by digitalization and increased service delivery.

Non-participant observations were conducted in case study 1 to increase the understanding of how digitalization and increased service delivery contribute to evolving the role of QM and increase understanding of the prerequisites (RQ1) and how using customer feedback can mobilize quality improvements (RQ2). One advantage of deploying observations is the potential for gaining insights into activities and behaviors that are taken for granted or go unnoticed by the interviewees (Ostrower, 1998). Complementing interviews with observations

thus facilitates a more encompassing view than choosing just one or the other. However, interviews have the advantage of providing focus and depth (Kvale & Brinkmann, 2009), whereas non-participant observations are not as focused and cannot be controlled or guided by the researcher. The non-participant observations were performed by the researcher and involved observing the quality manager of digitally connected services (DCS) at the firm during their workday. This included observing cross-functional meetings, the daily stand-up briefings with the firm's other quality managers, and DCS team meetings, allowing for rich insights into the QM work of DCS at the firm.

The researcher also held two focus groups in case study 1. One was initially conducted for exploratory purposes and to develop the study's precise research focus and purpose, while the second was used to validate the analysis and complement the data during the study's later phases. Due to the research's explorative nature, case study 1 began with an open, cross-functional focus group, consisting of several senior managers within the firm. Utilizing a focus group in a study's initial stages can be beneficial due to the broad perspective of the study matter that can be gained from the cross-functional setting and wide-ranging open-ended discussion questions (Flick, 2014). The meeting's purpose was to gain insights from different functions of the firm regarding the opportunities and challenges the firm was facing as it started delivering DCS. Since the researcher takes on a more passive role in a focus group compared to an interview, the risk of the researcher introducing bias into the discussion is lessened (Doyle, 2004), thus aiding in unveiling a holistic picture of the opportunities and challenges associated with DCS delivery. One significant challenge the firm experienced was the lack of knowledge on how customer feedback could be used as a basis for DCS improvements. The case firm therefore offered the potential for researching the prerequisites and capacities needed to use customer feedback to mobilize quality improvements. Later during case study 1, a focus group was conducted that included employees from the customer-facing customer service function and employees from the centralized quality function. The focus group allowed for a cross-functional discussion of the findings thus far, clarifying and complementing the information from a broad cross-functional perspective. Furthermore, the focus group aided in validating the initial analysis (Flick, 2014), as the focus group was presented with a synthesis of the findings matched with existing theory to allow the employees to review and comment on the analysis. Involving cross-functional focus groups was deemed important, since several different functions were involved with different aspects of the DCS development, delivery, and quality improvement processes.

3.4 Data analysis

For both research questions, the data collected were analyzed iteratively with a continuous interplay between literature, data collection, and analysis, thus utilizing a systematic combining approach (Dubois & Gadde, 2002). Furthermore, the data analysis was conducted in NVivo11 software, which facilitated coding the data collected (Richards, 1999). NVivo11 software is also suitable for dealing with the complexities of analyzing rich qualitative data (Richards, 1999), which was the situation in case study 1, since the data collected consisted of interview transcriptions and field notes from non-participant observations. The data analysis process followed a thematic analysis approach (Braun & Clarke, 2006), a method that aided in identifying patterns, or *themes*, in the collected data. Themes represent an important concept or pattern related to the study's research question and purpose, without trying to force the data into a predefined coding framework (Braun & Clarke, 2006). The process of identifying themes in the collected data occurred in several steps, where a continuous, iterative interplay between the data and literature aided in both identifying the initial codes and patterns and establishing the corresponding themes within and across the studies conducted. Examples of the themes that were identified, the corresponding categories, and initial NVivo codes are found in Table 3.

Table 3: Examples of the thematic coding of the studies

RQ	Example of second-order themes	First-order categories	Initial NVivo codes	Study
RQ1	*Interfaces	*Entry points of customer feedback	*Small data	Case study 1
			*Aggregated customer feedback	Case study 2
			*Intra-organizational interfaces	Case study 1, Case study 2, Interview study
	*Customer feedback processes	*Activities in the customer feedback usage process	*Channeling customer feedback	Case study 1
			*Operationalization of customer feedback	Case study 2
RQ2	*Potential absorptive capacity	*Acquisition of customer feedback	*Individual level acquisition of customer feedback	Case study 1
			*Functional level acquisition of customer feedback	Case study 1, Case study 2, Interview study
			*Customer-initiated acquisition of customer feedback	Case study 1, Interview study
			*Firm-initiated acquisition of customer feedback	Case study 2, Interview study
			*Data-driven analytics	Case study 3

	*Assimilation of customer feedback	*Analyzing small data	Case study 1, Interview study
*Contextual influences	*QM + digitalization	*Managing quality of digital offerings	Case study 1, Case study 3, Interview study
		*Competencies for digitalization	Case study 3
	*QM + increased service delivery	*Managing service quality	Case study 1, Interview study
*Role of QM	*QM's traditional role	*Managing product quality	Case study 1, Interview study
		*Organizational view of QM	Case study 1, Case study 3
	*QM's evolving role	*Managing functional quality	Interview study, Case study 1
		*Competencies needed for QM	Interview study, Case study 1

3.5 Methodological limitations

A single case firm was chosen as the setting for study 1. The findings of studies conducted using a single firm, however, have been argued to lack generalizability, thus impeding theory development (Eisenhardt, 1989). This notion has been argued against by Flyvbjerg (2006) and Dubois and Gadde (2002), who emphasize the depth and importance of content-dependent theory, which can arise from single case studies. The strengths and weaknesses of case study 1 (a single case study) are reversed in case study 2 (a multiple case study of several service firms across service industries in Sweden) and the interview study (which involves several manufacturing firms across different industries in both Sweden and the UK), and to some extent also in case study 3 (multiple case study involving four organizations in Sweden across different industries, with multiple interviewees per organization). Where case study 1 potentially lacks generalizability, case study 2 and the interview study risk a lack of depth. Case study 2 and the interview study are based on a fairly large number of firms, which potentially enables transferability across industries, but the data collection focused on a few interviewees per individual firm. However, since the phenomenon of interest is dynamic, complex, and lacks strong theoretical underpinning, all four studies have the potential to add to the phenomenon's theory development.

3.6 Research quality

There are several different ways to assess the quality of research; the concept of *trustworthiness* was chosen for this research (Guba, 1981; Lincoln & Guba, 1986). Choosing trustworthiness

as the quality assessment criteria facilitates a discussion that builds on the context-dependent and subjective reality in which the research take place, compared to discussions following a more naturalistic evaluation criteria (Lincoln & Guba, 1986). Trustworthiness is based on four criteria: credibility, transferability, dependability, and conformability (Guba, 1981).

An evaluation of research *credibility* requires examining how the research deals with the fact that data collected from interviewees portrays their subjective view of the world (Halldórsson & Aastrup, 2003). One way to increase credibility and deal with the inherent subjectivity of a human's account of events is triangulating different data sources, data collection methods, and using several researchers when data is collected and analyzed (Lincoln & Guba, 1986). Triangulation was used in this research, both in terms of the data sources employed in the studies (interviews, focus groups, and non-participant observations) and the continuous interplay between two or more researchers while analyzing the data collected. One example of data analysis triangulation employed in writing the papers is that one or two of the paper's co-authors were asked to review the data collected and identify patterns or themes that naturally emerged from the data or were related to the purpose of the papers. The analysis was then matched with the author's analysis to identify any discrepancies or new insights.

Transferability of the research concerns whether the findings of the research are generalizable. The challenge of potential generalizability was considered in part in the discussion of methodological limitations in section 3.5. Generalizability is a difficult subject because it is highly dependent on the research's *unit of analysis*. In this research, the unit of analysis was twofold: the *evolving role of QM* has been understood through the *use of customer feedback*, which includes the prerequisites and capacities in play when customer feedback is utilized for quality improvements. Rich empirical material is beneficial for facilitating transferability (Lincoln & Guba, 1986). The research conducted and presented in this thesis offers rich empirical insights and quotes, allowing readers to follow the analysis and determine whether the results are transferable to other research contexts. For case study 1, transferability primarily lies within the concept of using personalized customer feedback when working with quality improvements in DCS, both in terms of the prerequisites identified (RQ1) and increased understanding of how using personalized customer feedback can mobilize quality improvements (RQ2). In terms of case study 2, transferability lies in the possibility of applying the findings to service industries in general, since the study found commonalities in a range of different service industries in the cases examined. For case study 3, transferability lies in the

rich cross-case findings on the impacts of digitalization, which could be argued as applicable to other industries and geographical contexts. Transferability for the interview study lies in applying the findings to manufacturing industries in general, as the findings emerged from a varied data set that includes different industries and geographical locations.

Dependability, the third criteria, is ensured through documentation of the data collection and data analysis processes, which handles issues related to the research's reliability and entails leaving an audit trail of the research conducted (Guba, 1981; Lincoln & Guba, 1986) and the methodological choices (Halldórsson & Aastrup, 2003). To facilitate dependability, all interviews were recorded and transcribed, the field notes and secondary documents used were saved, and the coding structure and nodes were documented in the coding software. Furthermore, the methodological choices were discussed with peers and at both internal and external research conferences throughout the course of the research. Thus, the underpinnings of the methodological choices have been continuously discussed, questioned, and motivated, and the development of and decisions about methodological choices were discussed in conference papers, presentations, and journal papers.

Finally, *conformability* refers to the researcher's bias (Halldórsson & Aastrup, 2003), that is, the extent to which the researcher's values impact the research process and thus the study findings (Guba, 1981). Conformability is strengthened by providing insights into potential biases. During the interviews and focus group discussions, the researcher aimed to stay as impartial as possible, such as by avoiding leading questions. However, to collect data that would lead the research forward, the researcher at times steered the interviewees back to certain topics or questions that were found interesting and valuable through the iterative interplay of literature study and data analysis. Thus, since the interviews, except the initial interview in case study 1, were not unstructured in nature, it is possible the researcher missed some potentially valuable insights. Complete objectivity of qualitative research is both impossible and undesirable (Bryman & Bell, 2015), and it is evident that studies build upon the interviewees' own subjective accounts and experiences related to the studied matter. However, since the data analysis was discussed with the interviewees and paper co-authors, as well as at both internal and external research conferences, some of the researcher's potential biases should have been accounted for. Assigning different roles for the papers' authors, which has been done in the appended papers, is argued to further reduce the risk, and impact of biases (Eisenhardt, 1989).

In terms of ethical considerations, the interviewees voluntarily participated in the interviews and were informed prior to beginning that they could opt out of the interview at any time. Furthermore, the interviewees and firms were anonymized in the papers, and the researcher has not transferred information between the involved firms in a manner that could harm them. These procedures adhere to the four ethical principles of business research identified by Diener and Crandall (1978) and elaborated on by Bryman and Bell (2015): (1) avoid harm to participants, (2) ensure informed consent, (3) avoid invading participants' privacy, and (4) ensure the absence of deception.

3.7 Research process

The research process of my PhD journey has, just like the studies included, been exploratory and phenomenon-driven rather than positivistic and linear. Before the start of my journey in the beginning of 2016, my studies in industrial engineering and management provided ample opportunities to study the two worlds of business and engineering, and more specifically, to become comfortable in the intersection of these two worlds. As I also want to understand the human, individual, and intangible, I enhanced my knowledge through courses in social psychology and organizational behavior at the University of California, San Diego.

When I started, the general scope of my research was to explore organizations in a time of digitalization and increased service delivery, with an anchor in the field of quality management. The area fascinated and challenged me from the start, as it is evolving and transcends several different research streams. This also meant that I did not have a set theoretical framework from the start, rather the conceptual and theoretical framework presented in this thesis has been built iteratively as I conducted the four studies. These four studies were driven by opportunity and curiosity. First, case study 1 was initiated, where I was given the opportunity to dive into an organization that experienced both digitalization and increased service delivery, thus igniting my curiosity about how the role of QM is evolving due to the changes imposed upon manufacturing industries today. In case study 2, I had the opportunity to explore how a specific type of customer feedback, aggregated customer satisfaction information, was used both on a process level and in the form of the studied firms' absorptive capacity. In case study 3, I dived deeper into the impact of digitalization on quality management, which increased my understanding of the complexities of QM's role today. The interview study gave me an opportunity to explore firms in a different geographical setting, the UK, which was fascinating. Furthermore, the interview study provided me with the opportunity to do a research visit at

Cardiff Business School during the summer of 2019, which made it possible for me to conduct interviews face-to-face, visiting the firms and seeing their processes firsthand, and network with researchers at the Cardiff Business School. Figure 5 presents an overview of the research process in terms of a timeline of the studies conducted and the associated papers.

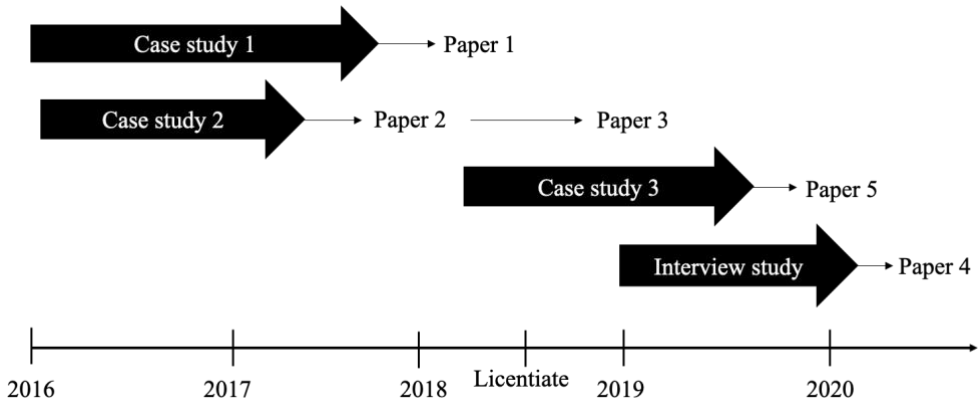

Figure 5: Illustration of the research process

4 Summary of appended papers

This chapter summarizes the five appended papers and outlines their key contributions in relation to the purpose and research questions of the thesis.

4.1 Paper 1: Digitally connected services: Working with improvements through customer-initiated feedback processes

Research design: Paper 1 explores how customer-initiated feedback is used for quality improvement in digitally connected services (DCS). The paper is based on a single case study of a manufacturing firm that began offering DCS as a standard addition to its physical product.

Results: First, the findings show that due to the user-centric nature of DCS, the improvement processes for these services need to be able to manage the concept of *quality-in-use*. As a response, the firm needs the ability to collect and use both codified and personalized DCS customer feedback. DCS create a new interaction pattern between customers and the firm by enabling the firm to receive customer feedback through digital-to-digital, digital-to-human, and human-to-human interfaces. Second, offering DCS poses challenges for the firm's quality improvement processes. The characteristics of DCS emphasize both the technical and functional dimensions of the firm's customer feedback systems. To react to DCS feedback, the firm also needs to have knowledge conversion processes in place, which the study finds lacking for personalized customer feedback on DCS. The challenge concerns the ability to juggle the individual customer's perspective, which is gained through the human-human customer feedback interface, with the abundance of codified DCS feedback digitally channeled into the firm.

Key contributions: This paper contributes to the thesis by identifying the *prerequisites* needed for using customer feedback to enable quality improvements (RQ1). First, it identifies and analyzes how *interfaces* impact using customer feedback for quality improvements. Second, it explores the role of FLEs in receiving, acting on, and channeling customer feedback into the QM function. Further, the paper improves understanding of the *capacities* needed to use customer feedback to mobilize quality improvements (RQ2). It explores how customer feedback can be converted into organizational knowledge by identifying the existing knowledge conversion modes in the QM function and pointing out areas for improvement. As the paper's focus is on how customer-initiated feedback, referred to in this thesis as *small data*, can be used

for quality improvements in DCS, it contributes by increasing knowledge related to the complexities of using customer feedback for quality improvements in an increasingly digital and connected world.

4.2 Paper 2: Use of customer satisfaction measurements to drive improvements

Research design: Paper 2 explores how the process of using a specific type of aggregated customer feedback, aggregated customer satisfaction measurements, differs between firms that utilize aggregated customer feedback to support concrete improvements and firms that use it in a knowledge-enhancing or symbolic manner. The paper is based on empirical data from 24 service firms operating in different service industries in Sweden.

Results: The paper analyzes the process of using the specific type of aggregated customer feedback and concludes that all firms in the study would benefit from more designated activities in the usage process. Furthermore, the paper shows that utilizing aggregated customer feedback to mobilize improvements requires combining (1) strategic long-term activities and (2) concrete reactive operationalization. Merely employing the former risks symbolic use of customer feedback, while the latter alone might result in a purely reactive organization that lacks proactive initiatives.

Key contributions: The paper contributes to this thesis by identifying *prerequisites* needed to use aggregated customer feedback to enable quality improvements (RQ1) and providing empirical insights into the presence or absence of activities in the different phases of using aggregated customer feedback. The paper shows how a lack of activities in the first phase of the customer feedback usage process results in a lack of activities in the final phase of the process, hampering the conversion of customer feedback into concrete improvements. The paper also points to prerequisites in terms of the importance of determining organizational ownership of specific uses of customer feedback, as well as a need for integration between various types of measurements and feedback. An additional prerequisite identified is the need for firms to employ a use that facilitates both concrete improvements and knowledge conversion. This usage entails activities that make the customer satisfaction information actionable for individual employees, combined with activities that convert and integrate customer satisfaction information into the firm’s knowledge bank to further its strategic understanding of its customers.

4.3 Paper 3: Absorptive capacity as an enabler for service improvement: The role of customer satisfaction information

Research design: Moving from the activities and processes explored in paper 2, paper 3 uses the concept of firms' absorptive capacity as an analytical lens to explore how firms use a specific type of aggregated customer feedback, customer satisfaction information (CSI), to facilitate service improvements. The paper builds on a qualitative study involving 24 firms in different service industries in Sweden.

Results: The results range from initiatives that predominantly impact the firms' PACAP to initiatives that transform PACAP to RACAP and initiatives that solely impact RACAP. The PACAP-related initiatives are establishing a sense of urgency (*relevance*), the existence of *multiple sources of CSI*, *engaging people* in the CSIU process, and *organization-wide communication*. Moving from PACAP to RACAP entails creating *actionability and accountability* for CSIU among employees, creating *incentives to mobilize changes* based on CSIU, and *developing people skills* needed to act based on CSIU.

Key contributions: The paper contributes to this thesis by increasing the understanding of how using customer feedback can mobilize quality improvements (RQ2), identifying the absorptive capacities in play when aggregated customer feedback is used for improvements. To move from merely symbolic use of customer feedback to a use that facilitates both knowledge conversion and concrete improvements requires developing different initiatives that in turn develop the firm's absorptive capacity. A knowledge-converting use of aggregated customer feedback predominantly relies on the firm possessing strong PACAP, while a use that focuses on concrete improvements involves developing the firms' RACAP to a greater extent. Thus, to facilitate encompassing service improvements, using aggregated customer feedback by combining concrete improvements with knowledge conversion is deemed most suitable, which in turn relies upon firms' developing both their PACAP and RACAP.

4.4 Paper 4: Absorbing customer feedback for quality improvements of products and services

Research design: The purpose of paper 4 is to create an understanding of how manufacturing firms' QM function acknowledges and exploits customer feedback about products and services by focusing on activation triggers and their positionality. Activation triggers are events that

urge the firm to take action based on internal or external stimuli, such as performance failures or customer feedback, thus triggering the firm's absorptive capacity. The positionality of activation triggers refers to where the activation trigger occurs: in the provider, joint, or customer spheres. Paper 4 is based on an interview study with quality managers in 17 manufacturing firms in Sweden and the UK.

Results: In the paper, the concept of ACAP is used as an analytical tool to explore how the firms' work using customer feedback to mobilize quality improvements differs between products and services. However, to understand the potential differences in ACAP for products and services, paper 4 emphasizes the presence or absence of *activation triggers* in relation to the firms' ACAP. The results point to a lack of service-related activation triggers, which is argued to impact the firms' ACAP in terms of translating service quality feedback into improvements.

Key contributions: This paper's contribution to the thesis is threefold: first, it identifies *prerequisites* needed for QM to use customer feedback for quality improvements (RQ1) by examining the activation triggers present for both product and service quality customer feedback, thus exploring QM's potential for acting on different types of customer feedback. Second, the paper points to how a lack of activation triggers for service quality results in underdeveloped ACAP in regard to service improvements. This shows the link between the *prerequisites* needed (RQ1) and the actual use of customer feedback, analyzed in this case through how the QM function absorbs external information, mobilizing quality improvements (RQ2). Last, the disparity in terms of activation triggers and the level of ACAP between products and services denotes an underdeveloped area of QM as manufacturing firms increase their service delivery.

4.5 Paper 5: Digitalization and quality management: Problems and prospects

Research design: Paper 5 sets out to explore current digitalization initiatives to identify the different roles QM practitioners play in the studied firms' digitalization journeys. Furthermore, paper 5 proposes the relationships of these roles in terms of explorative and exploitative QM practices, as well the relationships with the provider, interaction, and customer value-creation spheres. The paper is built on a qualitative multiple cross-case study design involving four large

organizations in Sweden. These organizations are referred to in the paper as Manufacturing A, Life Science Firm, Government Body, and Manufacturing B.

Results: The paper identifies five categories of digitalization initiatives: *enhanced communication*, *increased automation*, *practices for problem detection and solving*, *new business models*, and *developing an organization for digitalization*. These categories entail both explorative and exploitative QM practices to varying degrees, with some categories involving solely exploitative initiatives (increased automation), some involve only explorative (developing an organization for digitalization), while others involve a combination of both (enhanced communication, practices for problem detection and solving, new business models). Furthermore, paper 5 proposes six roles for QM practitioners in regard to digitalization. These roles are either exploitative or explorative in nature, where the exploitative roles serve to utilize existing digital technologies while the explorative roles aim to develop new practices and ways to create customer value through digitalization.

Key contributions: This paper contributes to the thesis by highlighting how *QM's role* is currently evolving due to digitalization, thus providing both a descriptive and prescriptive account of the changes in QM's boundaries and scope. As such, paper 5 informs the thesis on how the contextual element of digitalization impacts QM's role, thus primarily providing input to the overarching analysis of RQ1 and RQ2 in relation to the purpose of the thesis. The paper positions QM as a potential facilitator for digitalization by exploring how QM can support digitalization initiatives rather than merely positioning it as an entity affected by digitalization. Further, the digitalization initiatives identified are explored in terms of positionality and reach in the provider, joint, and customer spheres, thus offering insights into changes in QM's boundaries and scope.

5 Results

First, the prerequisites for using customer feedback as a means of enabling quality improvements (RQ1) are presented in subsection 5.1, followed by an exploration of how using customer feedback can mobilize quality improvements: in other words, the capacities needed (RQ2). The prerequisites are the structural elements required to use customer feedback to enable quality improvements. As such, the prerequisites serve to provide the organization with customer feedback by identifying (1) the positioning and types of interfaces for gathering customer feedback and (2) the different types of customer feedback processes needed in these interfaces. The capacities build on the prerequisites and function as the muscles needed to *use* the customer feedback channeled through the interfaces and customer feedback processes established in the prerequisites. Thus, subsection 5.2. outlines how firms can use customer feedback to mobilize quality improvements by building on the prerequisites and absorptive capacity required.

5.1 RQ1: What are the prerequisites for using customer feedback to enable quality improvements?

Several prerequisites need to be in place before using customer feedback to mobilize quality improvements. Based on the findings in the five appended papers, two subdomains of prerequisites are identified: first, QM needs to identify the *interfaces* in which the different types of customer feedback are created and channeled and, second, dedicated *customer feedback processes* need to be in place to allow QM to capture and use the customer feedback. Table 4 depicts the categories and concepts encompassed in the two subdomains, interfaces and customer feedback processes.

Table 4: Overview of the prerequisites identified

Subdomains of prerequisites	**Categories**	**Concepts**
Interfaces	Positioning	Direct: 1. Between the QM function and the customer, 2. Between the QM function and the product/service
		Intra-organizational: Between the QM function and other organizational functions, such as the marketing function or the firm's FLEs
		Inter-organizational: Between the QM function and a third-party actor like a dealer
	Type	Digital
		Human
		Formal

		Informal
Customer feedback processes	Focus	Product quality
		Service quality
		Technical quality
		Functional quality
	Type of process	Formal
		Informal
	Type of initiation	Active (firm initiated)
		Passive (customer initiated)
	Type of feedback	Personalized
		Codified
	Volume	Small data
		Aggregated data
		Big data
	Feedback acquisition	Instant
		Reactive

5.1.1 Interfaces

Customer feedback regarding different aspects of the quality of the offering emerges in various internal and external interfaces. The conducted research points to complexity in regard to interfaces, as many of them lack systematic processes for channeling customer feedback into the work with quality improvements (QI). Three interfaces were identified for firms' work with QI: (1) direct (between the QM function and the firms' customers and/or between the QM function and the product/service) (papers 1, 4); (2) intra-organizational (between the QM function and other internal functions, such as the marketing function, and/or between the QM function and the firms' FLEs, for example, the customer service function) (papers 1, 4); and (3) inter-organizational (between the QM function and third party actors interacting with the firm's customers, such as dealers) (papers 1, 4). Furthermore, these interfaces can be either digital or human (papers 1, 4) and formal or informal (papers 1, 4). Depending on the different types of interfaces, different requirements emerge for the customer feedback process.

Paper 1 emphasizes the importance of the QM function establishing a formal interface with the firm's FLEs, such as its customer service function. It becomes evident, however, from the findings in papers 1 and 4 that in many cases, neither formal nor informal interfaces are present between the QM function and most of the organization's FLEs. The exceptions are interfaces with FLEs who work as service technicians, maintenance engineers, or in similar quality-related

roles, where codified customer feedback processes are often present, such as standardized forms used by maintenance engineers to report a technical quality issue and how it was resolved. This standardized customer feedback then serves as a trigger for technical quality improvements (paper 4) by aggregating the codified and standardized customer feedback, using a statistical method to assess the pattern of the quality issue, and then improving the offering's technical quality. These interfaces are underdeveloped in terms of incorporating customer feedback processes concerning functional quality issues, as evident from the findings in paper 1; issues raised by customers related to the offering's functional quality, like problems with its assembly, are not formally received by the QM function and thus, are not channeled into formal customer feedback processes.

5.1.2 Customer feedback processes

The studied firms all employ different types of customer feedback processes. The findings in papers 1 and 4, however, point out that designated customer feedback processes for functional quality fail to reach the QM function in the manufacturing firms studied. Furthermore, the existing customer feedback processes are primarily built to support technical quality issues, while functional quality feedback is to a large extent channeled through customer feedback processes that are informal and passive in nature (papers 1, 4).

The different interfaces identified in section 5.1.1 impose different demands on the corresponding customer feedback processes. Customer feedback channeled through a human-digital interface, such as maintenance engineers or dealers reporting quality issues through standardized, online warranty reports, is by nature codified, and thus, reported easier than personalized customer feedback to aggregate and analyze in a structured manner. These types of interfaces and corresponding customer feedback processes are the most common ones found in the firms (papers 1, 4). Big data, which is channeled through a digital-digital interface that involves the digital product or service itself channeling customer feedback to a digital system at the firm, poses more complex demands on the corresponding customer feedback process due to its immense volume and variety in format and source, despite the increase in data analytics tools aiming to aid in the customer feedback process. Small data is generated in interfaces that are seldom standardized, as it is created in interactions between customers and employees (paper 1). The associated customer feedback processes, thus, also tend to be informal and non-standardized. As several interviewees stress that small data is a key building block for gaining an encompassing understanding of customer perceptions of quality, however, it is vital that QM

establishes designated customer feedback processes for the small data generated in these interfaces (paper 1).

A further prerequisite for using customer feedback for quality improvements is developing designated activities in the first phase of the customer feedback usage process, as shown in paper 2. The first phase concerns planning how the feedback should be used, and should therefore include activities that determine ownership of the particular customer feedback type (i.e., who, in terms of individual, team, or function, is responsible for ensuring that the customer feedback is translated into improvements). Determining suitable ownership, however, is challenging, as more often than not, several organizational functions are needed to assess and utilize the customer feedback to enable quality improvements and increased customer satisfaction as the end result (paper 1). However, paper 2 shows how aggregated customer satisfaction information often remains isolated within one or a few functions, frequently the marketing and communications functions. As expertise from several organizational functions is often needed to mobilize quality improvements (papers 1, 5), it appears vital to develop customer feedback processes to be used in a cross-functional manner.

5.2 RQ2: How can using customer feedback mobilize quality improvements?

In the firms studied, how customer feedback is used to mobilize quality improvements is predominantly based on the presence or absence of the prerequisites identified in section 5.1 and the interplay within and between what are here referred to as the horizontal and vertical dimensions of the firms' ACAP. The vertical dimension of ACAP refers to the different organizational levels: the cross-functional level (i.e., involving both additional functions and the QM function), functional level (i.e., the QM function), and individual level (i.e., individual employees). The horizontal dimension refers to the interplay between the organization and its external environment, which in this thesis refers to the customers' use of the offering. The horizontal dimension has been discussed in this thesis in terms of the provider, joint, and customer spheres. Table 5 presents an overview of the findings regarding how firms use customer feedback to mobilize quality improvements, which will be further elaborated on in subsequent sections.

Table 5: Use of customer feedback for QI in the horizontal dimension (marked as provider (P), joint (J), and customer spheres (C)) and the vertical dimension (column 1), departing from the concept of ACAP

	PACAP			**RACAP**	
	Acquisition		**Assimilation**	**Transformation**	**Exploitation**
Vertical dimension of ACAP	**What is acquired?**	**What triggered the acquisition (i.e., the activation trigger (AT))?**	**How is the customer feedback acquired analyzed and understood?**	**How is the new knowledge combined with existing knowledge?**	**How does the new knowledge get incorporated into existing processes, and/or aid in developing ones?**
Cross-functional level: *involves more functions than the QM function alone*	*Aggregated customer feedback, such as CSI (J) *Big data, such as sensor data (C)	*Formalized AT in a human-digital or digital-digital interface (J, C)	*Assimilation of CSI is predominantly done on a general/shallow level (P)	*Transformation of CSI is predominantly done on a general/shallow level (P) *Ad hoc but increasingly systematic, combining new knowledge from big data with existing knowledge (P)	*New knowledge derived from big data is increasingly used to develop both existing and new processes (P, J, C)
Functional level: *the QM function*	*Technical quality issues (P, J, C) *Big data, such as sensor data (C)	*Formalized AT in a human-digital or digital-digital interface (P, J, C) *Formal and/or informal AT between the QM function and other functions or 3rd party actors (P)	*Technical quality issues are aggregated in formal customer feedback processes, such as into warranty statistics, which are continuously monitored and analyzed (P) *In-depth assimilation of CSI is done within isolated functions, predominantly marketing and communications (P)	*Systematically combining new knowledge derived from technical quality issues with existing knowledge (P) *Ad hoc, combining new knowledge from big data with existing knowledge (P)	*New knowledge derived from technical quality issues is continuously and formally used to develop both existing and new processes (P, J, C) *New knowledge derived from big data is increasingly used to develop both existing and new processes (i.e., predictive maintenance) (P, J, C)
Individual level: *individual employees*	*Small data regarding functional quality, acquired by FLEs, or through for example social media (J) *Small data regarding functional quality informally acquired by QM employees from employees of other functions (P)	*Informal AT in a human-human interface (P, J) *Informal AT in a human-digital interface (J)	*Analyzed and understood by individual knowledge carriers through informal customer feedback processes (P)	*Ad hoc combination of new knowledge with existing knowledge, dependent on the initiative of the individual knowledge carrier (P)	*New knowledge regarding functional quality issues can be used ad hoc by the individual knowledge carrier to carry out an informal quality improvement (e.g., solving a customer's quality problem without altering existing quality improvement processes) (J)

5.2.1 Exploring the vertical ACAP dimension

The vertical dimension of the ACAP of the firms studied differs between functional and technical quality customer feedback, as the firms' ACAP regarding functional quality customer feedback is predominantly carried out on an individual level, while the firms' ACAP regarding technical quality customer feedback predominantly occurs at the functional and cross-functional levels.

On the individual level of the vertical ACAP dimension, the individual customer-facing FLEs, such as service technicians and customer service employees, are the key actors in acquiring small data about customers' quality experiences (papers 1, 4). However, the lack of customer feedback processes to channel this acquired customer feedback into the QM function (i.e., the transition between the individual and functional levels on the vertical dimension) results in this customer feedback often remaining isolated within the individual employees receiving the customer feedback. Further, assimilating the functional quality customer feedback and the potential transformation of new knowledge also occur predominantly on the individual level (papers 1, 4), thus making it challenging to exploit new knowledge to develop existing or new processes. As acquiring small data is the predominant source of customer feedback on functional quality in the firms studied, this is highlighted as an issue in the firms' work with functional quality improvements.

Most customer feedback acquired by the QM function is either aggregated customer feedback, such as warranty statistics, or customer feedback regarding specific technical quality issues. These types of customer feedback are often acquired by a group of employees within the QM function in a codified format through digitized systems. Customer feedback on technical quality is assimilated on a functional level, where data such as warranty statistics are analyzed and integrated with other types of customer feedback. Technical quality issues are analyzed, processed, and classified on a functional level (i.e., developing and using the QM function's assimilation capacity). Assimilating customer feedback leads to both developing new knowledge (i.e., developing the firm's transformation capacity) and actions to mitigate the root cause of the quality issue (i.e., developing exploitation capacity), for example, changes in the manufacturing process or in the digital offering's software. Developing new knowledge by integrating it with existing knowledge about the offering and its associated production or delivery processes often requires cross-functional integration of knowledge, involving functions such as IT (paper 5) and/or marketing (paper 1). The exploitation capacity, which

allows this new knowledge about technical quality issues to be applied to existing processes or aid in creating new ones, also generally involves more than just the QM function, for example, the operations and/or design functions. Thus, both transformation and exploitation capacities tend to be developed on both the functional and cross-functional levels in regard to technical quality issues.

5.2.2 Exploring the horizontal ACAP dimension

On the horizontal dimension of ACAP, the results presented in the papers point to three main elements of how customer feedback is used. The first is the difference in the horizontal dimension of PACAP when using customer feedback for functional quality or technical quality, while the second is the difficulty moving from PACAP to RACAP when using customer feedback regarding functional quality. The third is the increased interplay between firms' internal and external environments when using customer feedback for quality improvements, due to access to real-time customer feedback from digital products and services and increased service delivery.

First, the number and positions of activation triggers for functional quality customer feedback differ compared to those of technical quality customer feedback (papers 1, 4). The activation triggers for technical quality customer feedback are formalized and positioned in all three spheres (provider, joint, and customer). This stands in contrast to the activation triggers for functional quality customer feedback, which are few and informal and lack any triggers in the customer sphere. As the formalized activation triggers feed into formalized customer feedback processes, the acquisition and assimilation capacities for technical quality customer feedback are significantly more developed in the firms studied than the acquisition and assimilation capacities of functional quality customer feedback (papers 1, 2, 4).

Second, in the firms studied, the less developed PACAP of functional quality customer feedback leads to few or no formalized processes for moving from PACAP to RACAP, that is, combining the new knowledge with existing knowledge and applying it in quality improvement work. Although some interviewees stated that the processes used for transforming and exploiting the customer feedback could potentially work for functional quality issues as well, the failure to acquire and assimilate functional quality feedback makes work to improve functional quality like a game of hide and seek in the dark. Furthermore, since the tools that aid the QM function in prioritizing quality improvements are built on assessments of technical

quality issues, driving quality improvements for functional quality issues often relies on the individual quality manager and whether they have acquired and assimilated functional quality feedback. As work on functional quality improvements is conducted in the joint and/or customer spheres, the lack of interfaces between the QM function and customers leads to FLEs rather than QM professionals performing functional quality improvements.

Third, with access to real-time customer feedback such as sensor data of products and services, the interaction and processes between the provider sphere and the joint and customer spheres have increased. Firms that have developed interfaces, customer feedback processes, and data analytics tools and competencies to handle real-time sensor data showcase the capacity to acquire, assimilate, *and* carry out quality improvements almost in real-time. Acquiring, assimilating, transforming, and exploiting customer feedback in more or less real time is a growing capacity in the firms studied, although many respondents highlighted the lack of data analytics tools and the associated competencies as barriers to further developing this capacity (paper 5). As access to sensor data has resulted in an abundance of codified customer feedback, some of the firms studied have developed the ability to perform predictive maintenance, where maintenance work or quality improvements are carried out before a quality issue arises. As these actions are carried out either in the joint sphere (for physical products and/or analog services) or in the customer sphere (for remote quality improvements in digital products and/or services), the interplay between provider and joint and/or customer spheres is growing. Furthermore, increased service delivery, both digital and human, has also increased the interplay between the provider and the joint (analog services) and/or customer spheres (digital services), as new interfaces have been created and the number of interactions has increased (e.g., during customer feedback acquisition and when carrying out quality improvements). The predominant effort in developing the horizontal dimension of the ACAP of the firms studied, however, is directed toward improving the capacity to use technical quality customer feedback, mainly by acquiring and assimilating sensor data and carrying out remote, and at times, "real-time" quality improvements.

Conclusively, how to use customer feedback to *mobilize* quality improvements occurs in two dimensions—vertical and horizontal—of the firms' ACAP. More importantly, however, is not only what happens within these dimensions, but also the interaction between them, for customer feedback to mobilize quality improvements. The increased interplay between the provider sphere and the joint and customer spheres when acquiring customer feedback from digital

services (e.g., big data) in the firms studied, for example, has in some cases also resulted in developing new cross-functional processes aimed at developing new knowledge from the big data. As such, the horizontal dimension of ACAP is not isolated from the vertical dimension; rather, the integration and interplay between these two appears valuable when customer feedback is used to mobilize quality improvements.

6 Discussion

6.1 Conceptual framework—revisited

Integrating the results presented in Chapter 5 with the conceptual framework proposed in Chapter 2, three main contributions of the thesis emerge: (1) *quality-in-use*: quality as experienced by the customer during the use of the offering and continuously supported by the provider, (2) the *capturing role of QM*, and (3) the *converting role of QM*. Together, these three contributions aid in increasing the understanding of QM's evolving scope and boundaries, which in turn map QM's evolving role (visualized in Figure 6). The details of the revisited conceptual framework are elaborated on in the following sections (contributions in sections 6.1.1, 6.1.2, and 6.1.3, and the evolving role of QM in section 6.2).

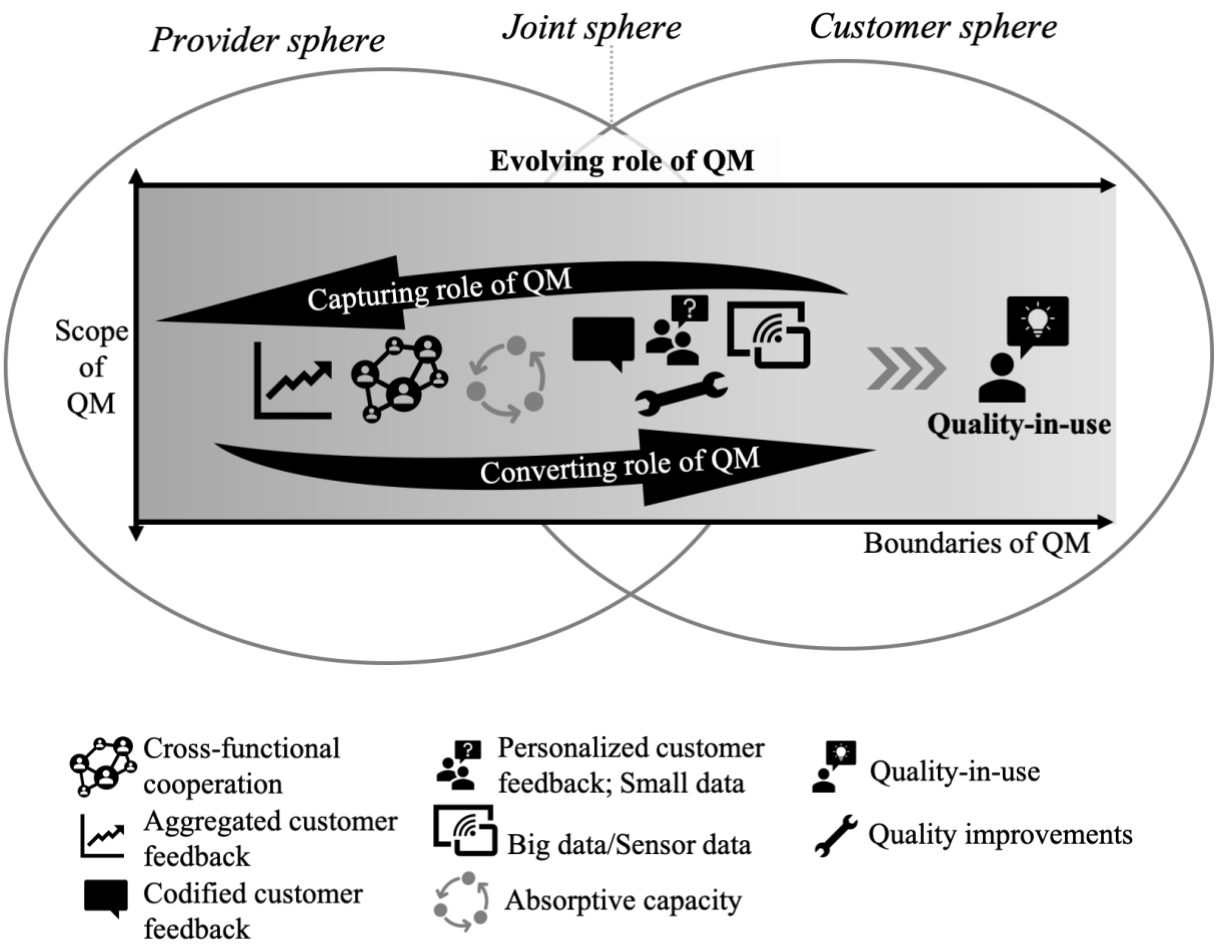

Figure 6: Conceptual framework—revisited, with the three main contributions of the thesis mapped out: Quality-in-use, the converting role of QM, and the capturing role of QM

6.1.1 Contribution 1: Quality-in-use

First, it is proposed that the concept of *quality* itself is changing, positioning quality as needing to be viewed as a construct that is subjectively perceived and experienced (in line with Weckenmann et al., 2015), rather than an internal binary pass-fail construct. Thus, the concept of quality is proposed as quality-in-use, which can be defined as *experienced by the customer and continuously supported by the provider*. The proposed concept of quality-in-use builds on three interrelated elements: (1) the increased focus on quality as being experienced and perceived by the customer (Wen et al., 2020; Weckenmann et al., 2015; Grönroos, 1984; Grönroos & Voima, 2013) rather than decided by the producer; (2) the increasing importance of the offering's in-use phase, driven by increased service delivery (Kohtamäki et al., 2020; Baines & Lightfoot, 2014; Beuren et al., 2013); and (3) the increased interaction and connection to the customer during the offering's use, driven by digitalization of processes, interactions, and offerings (Porter & Heppelmann, 2014).

First, the concept that quality assessment is conducted by the customer as a result of the customer's experience and perception of the offering instead of being decided by the provider firm has been extensively discussed in service quality literature (e.g., Grönroos, 1984; Grönroos & Voima, 2013). However, although the notion has been conceptualized that the quality of manufacturing firms' offerings is not decided by firms themselves but rather by their customers, it has not been underpinned empirically (Weckenmann et al., 2015) or proposed as a theoretical development in the QM field (Wen et al., 2020). The results of this thesis provide empirical support regarding how the provider firm alone cannot determine how customers will perceive an offering's quality, as shown in paper 1 when adding a digital service to the standard product offering increased the volume of personalized, customer-initiated feedback exponentially over several years. However, there were no processes to channel the customer feedback on perceived quality into the QM function, which showcases how the firm continued to operate as if quality is mainly decided by the provider, as customer feedback on technical quality is being acquired and used. These findings also highlight how customers are experiencing new types of issues and questions when an offering is changed, such as by adding services, thus further strengthening the notion of quality as being experienced and perceived by the customer.

Second, the increase in services, both analog and digital, being offered as additions to or instead of physical products (Baines & Lightfoot, 2014; Porter & Heppelmann, 2014) amplifies the offering's *use-phase*. As services arise in the interactions between the customer and the firm or

between the customer and the offering, QM work needs to extend to the joint and customer spheres as well. Further, as service quality is to a larger extent subjective and determined by customer experiences (Grönroos, 1984), customer perceptions about the offering's use, rather than internal quality measures, will be a more accurate assessment of perceived quality.

Third, providing products and services that are digitally connected to the provider firm not only enables but *requires* that quality be managed continuously throughout the offering's use (Porter & Heppelmann, 2014), for example, through remote quality improvements enabled by monitoring sensor data diagnostics in real time (Hyun Park et al., 2017; Davenport et al., 2012). As quality therefore does not deteriorate with use, but rather can be improved remotely based on analyzing customer feedback on the offering's use (paper 1), the concept of quality needs to be viewed as requiring proactive, continuous, and customer focused work (Wen et al., 2020; Weckenmann et al., 2015), rather than reactive and provider-centric work as the more conventional approach to QM (Martin et al., 2019). Managing quality-in-use and perceived quality amplifies the importance of being able to base improvements on customer feedback.

Integrating the three elements discussed above: (1) the concept of quality as being *perceived* by the customer rather than decided by the provider firm, (2) the amplified importance of the offering's *use-phase* when determining perceived quality as a result of increased service delivery, and (3) the increased interaction with customers during the offering's use due to digital technologies, resulting in a requirement to continuously *support* and improve the offering's quality during the use-phase, leads to conceptualizing quality as *quality-in-use*: quality as experienced by the customer and continuously supported by the provider firm.

6.1.2 Contribution 2: The capturing role of QM

Building on the concept of quality-in-use, the requirements have changed regarding which types of customer feedback need to be acquired and assimilated by the QM function to mobilize quality improvements. The emphasis on the offering's *use-phase* requires the QM function to possess the interfaces, customer feedback processes, and capacities that allow it to capture customer feedback generated during an offering's use. This thesis thus proposes the capturing role of QM as the prerequisites and capacities needed to acquire and assimilate customer feedback on quality-in-use. The capturing role of QM builds on three components: (1) extending the horizontal dimension of the QM function's PACAP into the joint and customer spheres, (2) developing the vertical dimension of the firms' PACAP to capture and channel the

customer feedback acquired by FLEs to the QM function, and (3) balancing the duality of small and big data in terms of both acquisition and assimilation.

First, the QM function needs to extend and develop acquisition capacity into the joint and customer spheres to ensure that customer feedback on the offering's use is captured. This aligns with the concept of quality being proposed as quality-in-use (see 6.1.1), defined as *experienced by the customer and continuously supported by the firm*. With quality-in-use, the provider firm does not possess a mandate to determine the offering's quality; rather, quality is subjectively experienced and assessed by the customer (consistent with Weckenmann et al., 2015). As a result, the QM function must continuously acquire customer feedback during the customers' use of the offering to monitor, manage, and improve its quality. Doing so requires the presence of interfaces between the QM function and customers in the joint and customer spheres. The acquired customer feedback, in turn, needs to capture both the technical and functional quality of the offering. The results of this thesis, however, point to a lack of interfaces for customer feedback on functional quality in the joint and customer spheres, which further supports existing research identifying the QM function's focus as internal (Martin et al., 2019). However, the emergence of *continuous* customer feedback, such as sensor data generated and acquired during the offering's use phase, has changed the customer feedback acquisition pattern in the joint and customer spheres from stochastic and reactive acquisition of customer feedback, that is, acquiring customer feedback after a quality issue occurs, to continuous and proactive acquisition of quality-in-use feedback prior to the occurrence of any quality issues.

Second, on the individual level of the vertical ACAP dimension (Martinkenaite & Breunig, 2016), individual employees, such as QM employees and FLEs, are key for acquiring small data, which often contains customer feedback on functional quality (Lam et al., 2017). The interface between FLEs and customers is an important generator of personalized customer feedback or small data (Lam et al., 2017), serving as a key point for acquiring rich data regarding customer perceptions of the quality (Xu et al., 2020). As QM employees often lack this direct human interface with customers, such an interface would need to be established for QM's absorptive capacity to develop in terms of functional quality. On the cross-functional level of the vertical ACAP dimension (Martinkenaite & Breunig, 2016), organizational alignment needs to be improved by (1) establishing channels between FLEs and the QM function and (2) improving cooperation between organizational functions, such as QM, IT, and customer service, to facilitate assimilating the customer feedback acquired.

Third, much focus in both research and practice is on acquiring and assimilating big data (Clarke, 2016). Although big data is drawing substantial research attention (e.g., Chen & Zhang, 2014; Cohen, 2018; McAfee et al., 2012), understanding how big data should be used to reap its potential and avoid merely drowning in data remains a challenge for many firms (Günther et al., 2017, Huberty, 2015). The results of this thesis further add to the notion of the difficulty associated with using big data, as the QM functions of the firms studied are to a large extent only scratching the surface of utilizing big data's power, highlighting the skill gap related to data-driven analytics as one reason. However, given the current prerequisites and absorptive capacities in place in the manufacturing firms studied and their inherent focus on the product and technical quality of services, there is a risk that the focus on acquiring and assimilating big data will neglect the functional quality aspects of both products and services. The findings in this thesis suggest it is in the interaction between customer and firm that the nuances and non-standardized quality perceptions of functional quality are generated (papers 1, 4). Thus, this thesis proposes that customer focus in QM is achieved through the capacity to acquire, integrate, and use both big and small data for quality improvements to ensure that QM is focused on both technical and functional quality.

The prerequisites and capacities to acquire and assimilate small data and CSI are, in this thesis, positioned as a way to operationalize customer focus in QM, as small data and CSI convey the customer's subjective experience in a manner that is difficult for big data to accomplish the because the subjective reasoning and analysis of big data is often from the firm's perspective. This presents a challenge, especially in manufacturing firms, as increased service delivery (Kohtamäki et al., 2020) and thus increased subjectivity in the customer's perceived quality (Weckenmann et al., 2015) risks being neglected from a QM perspective due to the technical nature of big data analysis. As one of QM's areas of expertise lies in data-driven improvements (Sony et al., 2020; Huyn Park et al., 2017), the emergence of big data and powerful data analytics tools can lead to QM becoming less inclined to develop processes aimed at acquiring and assimilating small data. The capturing role of QM in terms of customer feedback acquisition and assimilation must therefore be positioned as a role where acquiring big *and* small data is fundamental, as small data serves as the provider firm's insights into the subjective nature of quality-in-use, as well as a guiding light regarding what to ask of big data.

6.1.3 Contribution 3: The converting role of QM

Building on the *capturing role of QM* (see 6.1.2) in terms of acquiring and assimilating customer feedback on quality-in-use (see 6.1.1) is the *converting role of QM*, which is proposed in this thesis as the prerequisites and capacities needed to transform and exploit the acquired and assimilated customer feedback on quality-in-use. The converting role of QM entails three elements: (1) *action*: reacting to customer feedback by converting the feedback into quality improvements, (2) *knowledge*: converting customer feedback into knowledge regarding quality-in-use, and (3) and the capacity to continuously *integrate* both the action and knowledge elements.

First, the results showcase how the firms studied continuously and in a formalized manner react on customer feedback regarding technical quality issues, supporting research claiming that defect reduction is QM's original focus (Wen et al., 2020) and that it is a standard procedure in firms' QM work (Sony et al., 2020). However, although customer focus is considered the main principle of QM (Bergman & Klefsjö, 2010; Sousa, 2003), the results of this thesis show a disparity in how the QM function reacts to different types of customer feedback related to technical and functional quality issues. On one hand, the results show how customer feedback on technical quality leads to formalized improvement actions on a functional and potentially cross-functional level, such as involving both the QM and marketing functions. On the other hand, actions taken based on functional quality customer feedback predominantly occurs on an individual level, with individual FLEs taking action based on the customer feedback, often outside the QM function and through informal processes. As such, there is a risk that functional quality improvements are being solely conducted with an action focus, without ensuring that knowledge regarding the improvement action is converted and stored outside the individual employee. The results also show how digitalization has developed the capacity to react to quality issues. The increase in real-time customer feedback generated and acquired during customers' use of digital offerings (Hyun Park et al., 2017) has enabled the QM function to conduct real-time quality improvements directly in the customer and/or joint spheres. This extends the boundaries of firms' QM work, permitting the more external focus called for by Martin et al. (2019).

Second, since technical quality improvements are made through formalized processes on a functional and/or cross-functional level, knowledge development regarding technical quality is facilitated through knowledge conversions of externalization and/or combination (Nonaka et

al., 1996). This, in turn, ensures that the knowledge is retained within the organization. Knowledge generated from functional quality improvements, however, is predominantly generated through socialization, such as tacit-to-tacit knowledge conversion (Nonaka et al., 1996). The results of this thesis point to how this leads to knowledge about functional quality improvements being predominantly stored within individuals, making firms vulnerable in terms of employee turnover. Furthermore, having the prerequisites and capacities in place to gather real-time sensor data and customer feedback processes with the capacity to support data-driven improvements can not only allow more or less momentary reactions to current quality issues, but also allow future quality issues to be predicted and solved before they occur (see e.g., predictive maintenance, Lee et al., 2019). The sum of customer feedback from individual users becomes greater than the individual parts (i.e., each individual user's customer feedback) with the aid of the existing prerequisites and capacities developed for using customer feedback. Thus, the QM function is equipped not only to use customer focus as a guiding principle for its operations and strategy (i.e., in line with the linear outside-in perspective often attributed to the principle, e.g., Sousa, 2003), but also as the capacity to improve customer perceived quality without first encountering quality issues. As such, firms' work with QM can aid in driving customer focus, instead of merely abiding to it, enabling customer focus bidirectionality.

Third, using customer feedback to mobilize quality improvements requires continuously integrating use of customer feedback to mobilize *reactive* quality improvements, that is, taking action after a quality issue has occurred, with using customer feedback to mobilize *proactive* quality improvements, such as aggregating and assimilating sensor data from customers' use of an offering to predict and avoid future quality issues (e.g., through predictive maintenance, Lee et al., 2019). Proactive quality improvements require increased customer understanding achieved by converting customer feedback into knowledge about customer use of and experiences with the offering. The results of this thesis point to three main elements required for both reactive and proactive use of customer feedback. First, the capturing role of QM (see 6.1.2) must be developed to enable acquiring and assimilating the customer feedback needed to both mobilize reactive quality improvements and develop knowledge regarding customers' use of and experiences with the offering, in order to mobilize proactive quality improvements. Second, the horizontal dimension of the firms' transformation and exploitation capacities must be developed both to mobilize reactive and proactive quality improvements in the joint and customer spheres and enable knowledge development of quality-in-use. Third, the vertical

dimension of the firms' transformation and exploitation capacities must be developed to ensure knowledge conversion on a functional and/or cross-functional level.

6.2 The evolving role of QM

Building on the contributions presented in section 6.1, QM's evolving role emerges, encompassing the capturing and converting roles of QM and responding to the concept of quality-in-use. Zooming out from QM's role in individual firms, QM as a management philosophy is evolving due to digitalization and increased service delivery (Wen et al., 2020), which in turn affects QM's role in today's firms. This thesis conceptualizes QM's evolving role by mapping how the boundaries and scope of QM are evolving in response to the dynamic and contextual environment within which it operates (see Figure 7).

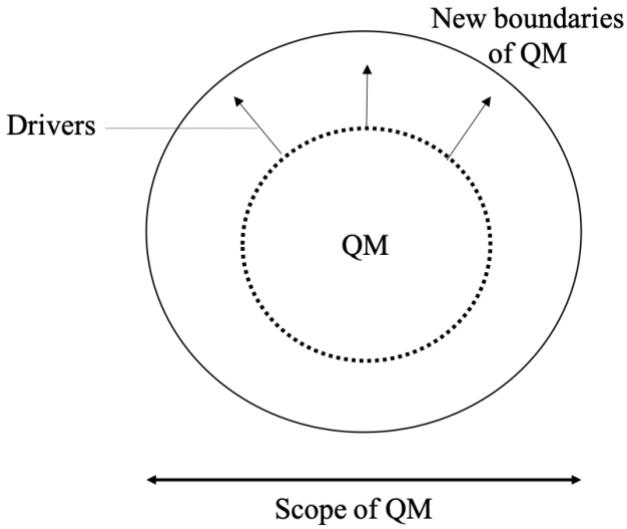

Figure 7: QM's evolving boundaries and scope in response to the contextual drivers of digitalization and increased service delivery

The results of this thesis show that QM's boundaries transcend into the joint and customer spheres to a greater extent than when only a physical product is delivered. This is exemplified by how QM's work with digital offerings is increasingly taking place in the interaction sphere through increased digital communication with customers. QM's boundaries also extend into the customer sphere through personalization of the digital offering based on customer feedback, which is continuously transmitted to the firm during product use. These results thus provide empirical support to the notion that QM's philosophy is moving from defect reduction to value enhancement (Wen et al., 2020).

As quality is no longer necessarily deteriorating with use, but rather can be improved during use of a digital offering (Hyun Park et al., 2017), QM's boundaries extend into the customers' use of the offering. As a result, QM moves from a predominantly inward-focused role (Martin et al., 2019) to a more interactive and externally focused role. This, in turn, leads to a change in QM's *scope*, as it becomes more closely and continuously connected to the customer through a digital connection. As firms offer services (digital or analog), QM's scope is extended to also incorporate the responsibility for working with managing service quality. With the increasing need to manage digital services and products within QM's scope, it is required to involve and develop other types of competencies, such as IT (Cohen, 2018; Davenport et al., 2012). However, the predominant focus on product and technical quality in terms of the prerequisites and capacities in place to use customer feedback for quality improvements risks leading to QM responding to its extended boundaries and scope by merely scaling up existing practices with the aid of digital technologies, instead of also incorporating the change in its scope.

QM's evolving role is therefore proposed to require the balance and expertise of managing both the offering's technical and functional quality to ensure that QM can continuously support quality-in-use. This balance and expertise requires competencies that are not traditionally found in QM functions, resulting in a need to cooperate closely with IT, FLEs (such as customer service employees), and sales. Organizational cooperation and alignment are thus key for successfully fulfilling QM's evolving role. As the complexity of the technical quality of offerings increases (Wen et al., 2020), however, the challenge for QM's evolving role is to develop and retain technical quality expertise, while also ensuring that the overarching QM strategy is focused on *quality-in-use*, which is assessed through subjective customer experiences (see 6.1.1). In the evolving role of QM, customer focus (Sousa, 2003) thus remains the central principle of QM. The role of customer focus itself, however, is also evolving. For QM to be customer focused in the age of digitalization and increased service delivery implies the need for QM to continuously transcend the customer-firm boundary, in order to manage and improve quality-in-use both reactively and proactively.

6.3 Theoretical implications

The findings in this thesis aid the field of QM with insights into how QM needs to evolve and respond to the changes arising from digitalization and increased service delivery. QM has been conceptualized in previous literature as consisting of a specific set of principles, practices, and

tools (Dean & Bowen, 1994). In this thesis, the focus has been on the principle of customer focus, which is considered an imperative QM principle (Bergman & Klefsjö, 2010), exploring how customer feedback can mobilize quality improvements, and as such, drive customer focus within the firm.

By reconceptualizing the concept of quality as *quality-in-use, experienced by the customer and continuously supported by the firm* as a result of digitalization and increased service delivery, the results of this thesis contribute to increasing the understanding of how and why QM work needs to adapt to its evolving context. This adds to an emerging research stream on how QM is evolving, consistent with Wen et al. (2020), Weckenmann et al. (2015), and Hyun Park et al. (2017). Further, the importance and role of small data in firms' QM work adds complementary insights to the growing research stream of data-driven decision-making (Sony et al., 2020; Huyn Park et al., 2017) and extends research on FLEs (e.g., Lam et al., 2017) by contextualizing their role in firms' QM work. The concept of quality-in-use also adds to the ongoing discussion on service quality, where service quality has been proposed as equal to value-in-use for service firm customers (Medberg & Grönroos, 2020). Quality-in-use encompasses the duality of a service offering that consists of both physical components and service elements (e.g., selling the performance of a physical product), where the customer will perceive the offering as a whole when assessing its quality, but the firm needs expertise regarding both product and service quality. As such, quality-in-use is a way for firms to operationalize how and where value is created, extending research on value creation (Grönroos, 2011) and technical and functional quality (Grönroos, 1984).

Methodologically, the results of this thesis call for research that can explore and analyze the combination of big and small data in firms' QI work. The growing research stream focused on big data analytics (see e.g., Chen et al., 2012) needs to be integrated with research on experienced and subjective small data (see e.g., Lam et al., 2017), which requires developing research methods suitable for handling these concepts simultaneously.

The results of the thesis extend current research on ACAP by conceptualizing the interplay between interfaces, as well as specific customer feedback processes, and ACAP, and by increasing the understanding of individual level activation triggers (Sjödin et al., 2019). Furthermore, the results provide contextual insights into the horizontal and vertical dimensions of ACAP in relation to QM, adding to research on ACAP's multidimensional aspects

(Martinkenaite & Breunig, 2016). Specifically, the results add to the functional level of ACAP's vertical dimension, increasing the contextualized understanding of ACAP in contemporary QM work. Further, the results of the thesis related to the interplay between individuals acquiring customer feedback (e.g., the firm's FLEs) and the converted knowledge on a functional level, extend the limited existing research on the individual level of vertical ACAP (Sjödin et al., 2019).

6.4 Managerial implications

The results presented in this thesis are relevant for managers and professionals tasked with increasing the understanding of customer experiences to improve the quality of their product and/or service offering. With the evolving role of QM (as discussed in 6.2), this work does not solely concern quality professionals, albeit they carry the formal responsibility for firms' QI work. Rather, work on using customer feedback to mobilize quality improvements depends on increased cross-functional cooperation, where a range of expertise and functions are required, with the QM function as the focal point. The results of this thesis suggest that cooperation and knowledge sharing of both technical *and* functional quality aspects is required between the QM, IT, and customer-facing functions such as the customer service function. Traditionally, and to this day, the QM function remains focused on hard technical quality aspects, with other functions such as marketing or sales often dealing more with relational functional quality aspects. In general, the results show how firms' FLEs are crucial in the work to acquire customer feedback regarding functional quality, making service technicians, maintenance engineers, and customer service representatives key actors in acquiring functional quality customer feedback. Furthermore, FLEs are not only crucial in acquiring customer feedback, but also often play an important role in carrying out quality improvements in the interaction between the firm and customer. Thus, FLEs need to be empowered to perform quality improvements, both by (1) providing the mandate to do so and (2) having customer feedback processes that can channel customer feedback from the FLEs into the QM function and (3) channel the analysis of the assimilated, aggregated, and analyzed customer feedback back to the FLEs from the QM function. This requires the presence of suitable interfaces, customer feedback processes, and the developed capacity to transform customer feedback into knowledge and improvement actions.

Further, QM's evolving boundaries and scope identified in this thesis, such as the extended reach of QM's boundaries and scope into the customer's use of the offering through digital technologies, result in the need for QM's role to evolve to encompass practices, tools, and competencies that can manage and improve the quality of the entire customer journey and experience. QM's evolving boundaries and scope unveil its evolving role, which differs from its traditional role in terms of proactive and reactive focus, main responsibility, and how it views the concept of quality. A general representation of QM's evolving role is depicted in Table 6.

Table 6: Overview of the traditional and evolving roles of QM

	Traditional role of QM	**Evolving role of QM**
Proactive focus	Internal	Internal, interface/interaction, external
Reactive focus	External	External
Main responsibility	Technical quality	Technical and functional quality
Assessment of quality	*Inspected* *Quality as decided by the provider, often prior to use	*Experienced* *Quality-in-use, as perceived by the customer
Quality of the offering viewed as	Objective	Subjective
Quality over time	Quality deteriorating with use	Quality often maintained or improving during use
Customer focus: Learning about customers	Collecting customer information	Absorbing customer feedback

6.5 Limitations

The limitations of the research predominantly concern three areas: (1) the geographical context chosen, (2) the sampling strategy of the firms involved in the studies conducted, and (3) the focal point of the analysis.

First, how the geographical context impacts the results has not been explicitly explored. The firms that were studied in the UK were not explicitly contrasted in terms of differences with the Swedish firms studied. However, although most of the firms studied operate in a Swedish context, many of them have an international or global presence, thus widening the geographical context and creating similarities with other international firms. Factors such as organizational culture, which can vary widely depending on the region in which the firm operates, could however be an interesting factor to consider when further developing the results of the thesis.

Second, the sampling strategy in this thesis was focused on traditional manufacturing firms that offer some type of service(s). However, technology intensive firms (often referred to as *tech firms*) also often offer a combination of digital and physical products and services, but predominantly describe their offerings as (digital) services. Thus, tech firms might view quality differently, as the service aspect is potentially more ingrained in their operations. Furthermore, the sampling strategy included manufacturing firms with varying degrees and maturity of service delivery: some firms provided basic services while others provided advanced services. Further research should therefor aim to sample only manufacturing firms that provide similar types of advanced services.

Third, the focal point of the analysis has been the QM function and how customer feedback is used to mobilize quality improvements. Although some cross-functional data were collected, an extension of data collected from other functions could enhance the results even further. Moreover, the sampling did not distinguish between different size QM functions and how they are organized. Future research could aim to sample QM functions of similar size and organization to provide more insights into standard practices.

6.6 Future research

The results of this thesis have outlined the evolving role of QM by identifying and exploring the prerequisites and capacities needed for using customer feedback to mobilize quality improvements. To further increase understanding of how firms can learn from and make quality improvements based on their customers' perceptions, three future research avenues are proposed.

First, as functional quality has become an increasingly important aspect of customers' quality perceptions due increased service delivery and digitalization, future research should aim to explicitly incorporate the customer. Researching how customers perceive functional quality can expand the understanding of which type of customer feedback is needed for firms to better understand functional quality and which types of interfaces most suitably capture and channel this customer feedback.

Second, integrating small, aggregated, and big data is a promising and impactful future research avenue (e.g., Xu et al., 2020). The attention directed by research communities and practitioners toward use of big data (e.g., Chen & Zhang, 2014; Clarke, 2016; McAfee et al., 2012) should

be complemented with insights into how qualitative small data (Lam et al., 2017) can be integrated with big data to facilitate encompassing analyses of customer perceptions and potential quality improvements. Future research could thus explore the competencies, processes, and tools needed to do this. Research that aims to increase understanding of how to integrate and combine insights from big and small data, however, requires a sophisticated research design that can accommodate both high volume data analysis and qualitative, subjective, and non-standardized data analysis. This evolving phenomenon is difficult to study within the existing paradigm of research methods, thus requiring a highly sophisticated mixed methods approach that combines quantitative and qualitative research methods.

Third, the results of this thesis have pointed to how QM's scope, boundaries, and role are evolving in response to the context within which manufacturing firms operate today. As the need for cross-functional work increases, the organization of QM work becomes an interesting path for future research. As the results show how the QM function primarily revolves around technical quality issues, there is a need for research that focuses on the competencies and organizational structures needed to manage and improve both the technical and functional quality of an offering. This research would contribute to existing literature on emerging QM competencies (e.g., Martin et al., 2019) and could aid in developing a proposition of the QM function of the future.

7 Conclusions

Digitalization and increased service delivery drive the need to develop the capacities to use customer feedback for quality improvements. For this to occur, the QM function needs to have structural elements in place, referred to in this thesis as the *prerequisites*. The prerequisites identified and discussed in this thesis are positioned in two categories: (1) the QM function's interfaces and (2) the customer feedback processes in place.

Building on the structural elements, that is, the prerequisites, the QM function needs to have certain capacities in place to use customer feedback to mobilize quality improvements. In the context of this thesis, these capacities have been proposed as developing the QM function's absorptive capacity. Particular emphasis is put on developing the acquisition and assimilation capacities, in other words, the *potential absorptive capacity*, to accommodate collecting, integrating, and analyzing a wide variety of customer feedback, including small, big, and aggregated customer feedback. Further, the customer feedback acquired should capture customer experiences with both technical and functional quality issues. As the firms studied in general have both the prerequisites in place and the capacities to use customer feedback regarding technical quality issues, developing the prerequisites and capacities needed predominantly concern collecting and using functional quality feedback. The transformation and exploitation capacities, or the *realized absorptive capacity*, need to be developed to convert the acquired and assimilated customer feedback about functional quality into knowledge to promote the QM function's understanding of customers perceptions and mobilize proactive quality improvements. The lack of the formal prerequisites and absorptive capacity to use customer feedback as a basis for improvements of functional quality in the firms studied further strengthens the notion that QM continues to be predominantly inward-focused (Martin et al., 2019), thus showcasing a provider rather than customer focus and the lack of some of the skills and knowledge needed to embrace a more customer-focused external perspective.

As digitalization and increased service delivery drive changes in the context in which QM operates, QM's boundaries and scope are evolving (Figure 8). QM's evolving boundaries are conceptualized in relation to the provider, joint, and customer spheres (Grönroos & Voima, 2013) and its scope concerns the activities and responsibilities encompassed in its role.

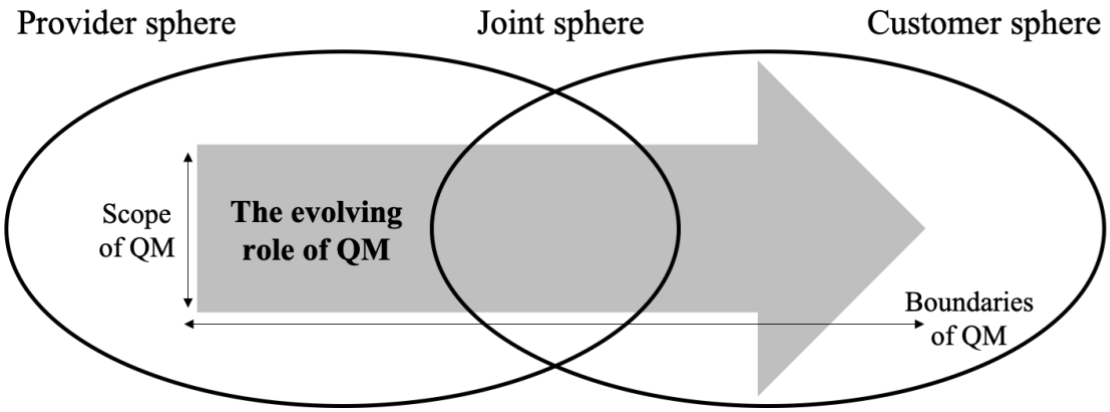

Figure 8: The evolving boundaries and scope of QM's role

Table 7 presents the drivers and the evolving boundaries and scope of QM. The drivers do not merely individually alter QM's scope and boundaries as isolated forces, rather they interact with and feed into each other, resulting in both tangible and intangible outcomes. One example is digitalization and increased service delivery, which interplays both in terms of the offering's development and delivery as well as impacts how firms manage offering quality.

Table 7: Drivers and QM's evolving boundaries and scope

Drivers	**Exemplified (Direct, *Indirect*)**	**Evolving QM boundaries**	**Evolving QM scope**
Digitalization	Big data (Paper 1, *Papers 4, 5*)	*Continuously connects QM to the customer-use phase of the offering, thus extending QM's boundaries into customer processes	*Personalization of QM improvements *Aggregated and in-depth understanding of how customers use the offering, thus providing insights into which features could be important from a QM/QI standpoint
	Digitalization of existing internal methods and processes (Paper 5)	*Does not affect QM boundaries	*Exploitation: Can scale up existing processes and methods, potentially extends the scope in terms of skills and competences needed
	Digitalization of new internal methods and processes (Papers 1, 5)	*With the development of new internal methods and processes, the potential reach into the use phase of the product or service can extend QM's boundaries	*Exploration: Possibility of creating new processes and methods that can both extend the scope in terms of new processes taking place (e.g., managing and improving digital service quality with a functional quality focus rather than merely a technical quality focus), as well as the need for new competencies and skills

Digitalization + increased service delivery	Delivery of digitally connected services (DCS) (Papers 1, 4)	*Extends the reach of QM into the interaction and customer spheres	*Extends QM's potential and required operating space and pace from internal and reactive to transcending and proactive *Continuous customer interaction *Real-time customer interaction *Quality becomes something different compared to either a physical product or traditional service—new playing field for QM, thus extending QM's scope of work
Increased service delivery	Delivery of an outcome, such as selling uptime or a performance (*Papers 2, 3*, Paper 4)	*Extends the responsibility, and reach of QM into customer use of the offering	*Quality needs to be managed and improved continuously, thus proactive QM is vital *Extends QM's scope in terms of needing to also incorporate small data and other customer feedback related to the offering's functional quality. *Aggregated customer satisfaction information (CSI) grows in importance, which means QM needs to develop a CSI-process

As the evolving boundaries and scope of QM are mapped by exploring how firms can use customer feedback to mobilize quality improvements, light is shed on QM's evolving role. First, by offering (digital) services, QM's reach and scope is extended into the joint and customer spheres, which requires QM to be more closely connected to the customer than in a traditional product manufacturing setting. Second, QM's evolving role requires organizational alignment through improved cross-functional cooperation with customer facing functions, such as FLEs, and the IT function, to both facilitate acquiring small data and customer feedback on function quality as well as obtaining the competencies needed to acquire and analyze big data to continuously improve digital offering quality. Third, because functional quality becomes increasingly important for customers as offerings become more service-based (whether digital or human), QM's evolving role needs to balance and possess expertise in both technical and functional quality. Thus, due to digitalization and increased service delivery, the role of customer focus in QM has become both increasingly vital and increasingly intertwined with the evolving role of QM itself, requiring the role of QM to evolve its scope and boundaries in a way which allows QM to manage perceived quality-in-use in a continuous, proactive, and customer-focused manner.

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