"Keep your Customers on the Radar": Exploring the facilitation of IT for service quality in a B2B and B2G context.

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Glossary

Acronym	Full term	Definition
B2C	Business-to-Consumer	Organization or business that sells its products or services to consumers (Nemat, 2011).
B2B	Business-to-Business	Describes transactions between businesses, such as between a manufacturer and a wholesaler or between a wholesaler and retailer (Nemat, 2011).
B2G	Business-to-Government	Organization or business that sells its products and services to various government levels (Nemat, 2011).
TNNL	Thales Naval Netherlands	Part of Thales group, delivering naval mission systems and radar solutions.
SD	Service Desk	The Service Desk (SD) is a contact service and offers first line support. The SD registers, assigns and dispatches the incoming request or incident to the applicable Thales Naval Netherlands (TNNL) process to solve the request.
ITIL	Information Technology Infrastructure Library	Service management framework consisting of a set of best practices for managing IT, such as regular contact with customers and good problem closure techniques (Jäntti et al., 2012).
SERVQUAL	Service Quality Model	Multidimensional service quality assessment tool to assess the service quality by the organization and customer (Parusaman et al., 1985).
VPC	Value Proposition Canvas	Clarifies the customer understanding of their needs and wishes and how the organization intends to create value for customers (Osterwalder et al., 2014).
DMI	Directie Materiële Instandhouding	Maintenance organization of the Royal Dutch Navy, responsible for the maintenance of ships, submarines and systems. ¹
ITSM	Information Technology Service Management Maturity Model	Refers to the implementation and management of quality IT services that meet the needs of enterprises nowadays (Tang & Todo, 2013).

¹ <u>https://www.defensie.nl/organisatie/marine/eenheden/directie-materiele-instandhouding</u>

ABSTRACT

Objective: Organizations increasingly implement IT services to enhance service quality within their enterprise. The service quality is often examined in a business-to-consumer (B2C) context, yet few studies look into service quality in business-to-business (B2B) or business-to-government (B2G) environments with a facilitating role of IT. This study explores the service quality in a B2B and B2G context. Ultimately, this research aims to provide practical implications for the front office on how to enhance service quality facilitated by IT.

Methods: A mixed-method study was executed at Thales Naval Netherlands (TNNL), which is a high-tech international organization for naval mission systems and radar solutions. In particular, three studies have been conducted in succession. First, a survey was used to get a general impression of the stakeholders perceptions of service quality. The service quality gap model was used to identify the perception, which consists of five dimensions: tangibles, reliability, responsiveness, assurance, and empathy. Second, semi-structured interviews were held to get a more in-depth understanding of the motivation behind the responses to the survey and people's expectations towards service quality. Finally, workshops were held with organizational staff and customers. The Value Proposition Canvas (VPC) was used to identify the critical points for service quality and how to enact on it with the use of IT as an organization.

Results: The results show that internal stakeholders (organizational staff) perceived service quality lower in relation to external stakeholders (customers). In particular, internal stakeholders perceived assurance and responsiveness lower in relation to external stakeholders. Moreover, all stakeholders perceived responsiveness as the main service quality dimension for improvement. The qualitative part indicated that the lack of communication in the service process is the main reason for this outcome. Furthermore, tangibles is rated lower by the strategic team since they believe that the IT service tool is not implemented the right way yet. There are no major gaps found in the other service quality dimensions.

Conclusion: This study concludes that delivering service quality requires actions on a strategic and tactical level. On a strategic level, the service quality can be improved through a service alliance, communication and collaboration. On a tactical level, IT forms a pivotal factor to support the service delivery. However, it is not the solution to improve the service quality. The whole organization should feel responsible for creating a successful service outcome. To conclude, IT cannot form a solution to all stakeholder needs and wishes, but it is a valuable asset to enhance service quality.

Keywords: service quality, information technology (IT), business-to-business (B2B), business-to-government (B2G)

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1. INTRODUCTION

1.1 Background

Nowadays, manufacturing enterprises are beginning to attach more importance to the role of services in the process of value creation (Feng et al., 2020). Services has become an effective way to accelerate growth rate and profitability (Berry et al., 2006). Furthermore, services can become an important source to ensure customer loyalty and satisfaction in business markets (Davis et al., 2008). According to Zeng et al. (2010), a high and unique service quality is a way to win your customers and make them loyal for a long period of time. Information technology (IT) has the potential to improve the service quality of enterprises. Many traditional services have been moved or are planning to move to the electronic environment (Taherdoost et al., 2013). By incorporating new service technologies, frontline workers can augment their work and provide more customized and blended services (Davenport & Kirby, 2015). The shift towards new service technologies leads directly to a change of customers perceptions and needs in terms of service quality. For instance, customers expect short lead times and more access to information (Davenport & Kirby, 2015). By finding insights in the customers' needs and wishes, new technological service opportunities can be identified to gain a competitive advantage.

There has been a wide range of service quality research in the business-to-consumer (B2C) environments, in which an organization or business sells its products or services to consumers (Nemat, 2011). Yet little is known about how service providers and consumers in a business-to-business (B2B) and business-to-government (B2G) context perceive service quality and enact on IT services (Pemer, 2020). Research and theory lag the technological advances to improve its service quality in this context (Pemer, 2020). This study explores the service quality of Thales Naval Netherlands (TNNL) that is active in the B2B and B2G market. B2B describes transactions between businesses, such as between a manufacturer and a wholesaler or between a wholesaler and retailer, while B2G encompasses products and services to various government levels (Nemat, 2011).

TNNL is part of the Thales Group and active in the defense, security and public transportation sector, with almost 2000 employees.² Safety and security are the main priorities of their business. In the Netherlands, the corporate head office is located in Hengelo. Since 1922 TNNL is a leader in radar technologies and radar systems for Naval ships. The customer account teams and product teams are the key axes for operation and cooperation within TNNL and thus provide the backbone of the organization. The main task of the customer account teams is designed to ensure customer focus and align different disciplines with direct contact to the customer to be able to have 'one voice' to the customer. The product team is designed to ensure standard solution definition, development and delivery, in order to offer competitive



² <u>http://www.thalesgroup.com/en</u>

and innovative solutions towards their customers. A solution consists of a combination of one or more TNNL products and services. The product team and customer account team work closely together and provide each other with information derived from customers or the product itself to provide the best services during the lifecycle of a product.

TNNL has a service portfolio of 15 services including the service desk. The service desk of TNNL is a contact service and offers first line support to customers. It registers, assigns and dispatches the incoming request or incident to the applicable TNNL process to solve the request (Appendix A). Every request by a customer is monitored till its closure. The management of the service desk is based on the processes and methods of the IT Infrastructure Library (ITIL). ITIL is the most widely used IT service management framework consisting of a set of best practices for managing IT, such as regular contact with customers, good problem closure techniques and taking control (Jäntti et al., 2012). Based on the ITIL standards, TNNL recently implemented the customer portal to support the service desk is a crucial point between the customer and service provider, it accompanies customers by providing a single point of contact and an answer in a timely manner on their requests. Because the service desk is located at the heart of the customer interface, it has a strong impact on service quality and customer satisfaction (Jäntti et al., 2012). Therefore, it can be seen as an important service to explore the service quality of a company.

1.2 Problem statement

To get more familiar with the business problem and the background of the problem, several interviews are conducted with the front office service managers of TNNL.

No.	Date	Location	Duration	Function
1	22-01-2021	Video call	32 min.	Service Portfolio Manager
2	25-01-2021	Video call	38 min.	Chain Manager Services
3	25-01-2021	Phone call	30 min.	Customer Contact Center Manager
4	26-01-2021	Thales Hengelo	45 min.	Customer Contact Center Engineer
5	28-01-2021	Video call	57 min.	Service Sales Manager
6	03-02-2021	Video call	45 min.	Quality Department Manager

Table 1. Problem setting interviews.

When formulating the problem statement, the most important aspects discussed in the interviews arise from the fact that TNNL is a project-oriented company. A project-oriented company is conceptualized as an entrepreneurial, future- and stakeholder-oriented innovating organization, which uses projects as temporary, task-focused organizations for developing products (Gemuenden et al., 2017). With the high investments in new radar technologies, TNNL develops innovating and advanced systems and responds to the dynamic and constant change of environment by creating new products. However, there is a lack of

investments in services and development of services. The service desk applies a traditional approach. All services TNNL delivers are based on requests of customers and are tailored to meet customer's individual needs. The changing market forces TNNL to shift away from its traditional service approach and to move towards a more proactive and strategic digitalized approach. Scholars call this the "inflection point" and mention that many service industries need to undergo fundamental changes to meet the potential threat of disruption (Prem, 2020). According to Parviainen et al. (2017), neglecting IT services could create a risk of losing the game in competitive markets. The IT service management maturity model (ITSM), as shown in Appendix A, refers to the implementation and management of quality IT services that meet the needs of enterprises nowadays (Tang & Todo, 2013). Currently, TNNL can be characterized as level 1 of the ITSM model in terms of services, which describes a reactive service process.

The current traditional, reactive and ad hoc process results in dissatisfaction among both sides, the service provider and consumer. For instance, this reactive process results in a long service process in which accurate monitoring is required till the closure of a request by the service provider. Furthermore, reactive firms are often characterized as less systematic and identified as suppliers candidates only after a problem actually occurred by service consumers (Krause et al., 1998). IT has the potential to improve the service quality of enterprises. IT services result in lower response times and shift towards a more systematic, proactive and effective approach (Davenport & Kirby, 2015). According to Sing (2002), an effective customer service helps to build and maintain customer's relationship, which is the key success in industrial businesses. A better service quality can help to satisfy the service provider and consumer. By investigating the discrepancies in service quality between the service provider and consumer, the gaps for service quality can be identified. The gaps provide the input for decisions regarding suitable service levels and how to enact on IT as front line workers to improve service quality.

To summarize, there is need for a better understanding of service quality by the service provider and consumer in times of technological disruption to enhance the service quality of TNNL.

1.3 Research objectives and questions

The aim of this report is to contribute to the research on the facilitation of IT for service quality in a B2B and B2G context and to formulate a plan of action for improving the service quality of the front office of TNNL. Therefore, the main research question is the following:

"How can the front office service of TNNL improve its service quality through IT?"

To answer this question, the following sub-questions are formulated:

1. What is service quality?

- 2. Which dimensions are important in service quality?
- 3. How is IT influencing service quality?
- 4. Which service quality dimensions offer room for improvement?
- 5. How can the front line workers of Thales enact on IT for improvement?
- 6. Which actions does this require from the front office service management?

1.4 Research methodology

To answer the research question and sub-questions stated above, different data collection methods are used: a literature review, survey, follow-up interviews, and a workshop.

The first three sub-questions are related to the current literature on service quality. To answer these sub-questions, a literature review on scientific literature is conducted. The main purpose of the literature review is to give a theoretical background on the concepts of service quality, service quality dimensions, theoretical models and the relationship between IT and service quality.

The service quality evaluation model (SERVQUAL) of Parusaman et al. (1985) is used to structure the fourth research question. This well-known model in the literature integrates five different service quality dimensions: responsiveness, reliability, assurance, empathy, and tangibles. It is an objective evaluation tool to measure the quality of services used by different researchers in a variety of industrial, commercial, and non-profit settings at an international level (Landrum et al., 2011). The research question is answered based on a survey and semi-structured follow-up interviews. The survey consisted of a ranking of statements from disagree to agree based on the service quality dimensions. The main purpose of the survey is to visualize the current perception of service quality and to identify dimensions that offer room for improvement. Next to the ranking of statements, follow-up interviews are needed to fulfill a more qualitative approach. The interviews help to get an understanding of the motivations behind the ranking of statements and to identify the expectations for service quality with the use of IT. For the analysis, the interviews are transcribed and coded. Relevant and important quotes are included in the results section to support the findings in the survey.

Furthermore, a collaborative workshop is conducted in the internal and external environment. The workshop is based on the value proposition canvas (VPC), this tool clarifies the customer understanding of their needs and wishes and how the organization intends to create value for customers (Osterwalder et al., 2014). There is a fit between two sides, when the needs and wishes of the customer match with the services offered by the organization. The goal of the external workshop is to explore the main improvements for service quality next to the SERVQUAL dimensions. The internal workshop addressed these improvements to create value for customers. The requirements to ensure a fit between the customer and organization provide the input for the final two-sub questions. The final two sub-questions are respectively about recommendations for the front office service managers to support the strategic and



tactical decision making regarding suitable service levels. Together, the answers on the sevenquestions answer the main research question: *"How can the front office service of TNNL improve its service quality through IT?"*

1.5 Research scope

This research is limited to the first three phases of the regulative cycle of van Strien (1997). Van Aken and Berends (2018) describe this regulative cycle as an efficient way to solve a welldefined business problem. The regulative cycle as shown in figure 1 consists of 5 steps: (1) problem statement, (2) analyses and diagnosis, (3) design, (4) intervention, and (5) evaluation. The 5 steps are often an iterative process. This means that there is no strict order of the phases. It may be that the problem definition is improved through interaction with the customer in a later stage.



Figure 1. The regulative cycle (adapted from van Strien (1997)).

The current chapter, chapter 1 introduces the problem statement. According to van Aken and Berends (2018), the problem statement is the first step of the regulative cycle and provides guidance for the current research. As identified in chapter 1, the changing digitalized environment forces TNNL to shift away from its traditional, reactive and ad hoc service process to ensure service quality. This problem statement provides guidance for the theoretical framework, in which the service quality dimensions and impact of IT on services are reviewed based on literature. The theoretical framework provides an answer to the first three subquestions. Step 2 is the analytical part of the research process. In this step, the service quality perception of both the service provider and consumer is analyzed to answer the fourth research question. Once this has been identified, a solution can be designed. This third step forms the starting point for service quality improvements, called the 'design' phase. The design phase takes place in the form of a workshop, which provides the opportunity to discuss potential solutions for improving service quality. The workshop answers the final two subquestions. The final steps of the regulative cycle are the intervention and evaluation. According to van Aken and Berends (2018), steps 1 to 3 are often performed by the researcher, while steps 4 and 5 are performed by the company itself. In these final steps, the solution to the problem is implemented and assessed. It may lead to new problems and a new start of



the regulative cycle. The scope of this project is not to implement the solution, but solely present it to the company, the 'intervention' and 'evaluation' phase is therefore not included. However, the workshop provides the opportunity to discuss and evaluate potential consequences of solutions.

The scope of this study is limited to the service delivery of the service desk. To be more specific, the service desk consists of support for logistics and technical support. Support for logistics is fulfilled by sales support, such as spares and repairs. Technical support is fulfilled by the Customer Contact Center engineers of the service desk, they provide help regarding specific problems with a product. This study is limited to technical support. Technical support is often subdivided into tiers or levels. The number of levels a business uses depends on the business needs regarding their ability to sufficiently serve their customers.³ A common support structure revolves around a three-level technical support system, as in the case of TNNL. Figure 2 shows the three-level technical support system of TNNL. Before customers submit a request to the Customer Contact Center engineers, the 1st and 2nd line of internal support within their own organization could not solve the request due to limited knowledge. To retrieve more knowledge of the product in order to solve a request, the Customer Contact Center of TNNL is approached by customers (3rd line external support to 1st line internal support of TNNL). The Customer Contact Center engineers provide initial support responsible for basic customer issues. Furthermore, they are responsible for the management, registration and closure of requests. When more in-depth technical support is required to fulfill a request, the Customer Contact Center engineers approach the system engineers, who are part of the development team (2nd line internal support of TNNL). These technicians are more experienced and knowledgeable on a particular product.



Figure 2. Three-level technical support system.

Finally, this study will be limited to the high-end customer segment. According to Anderson et al. (2006), it is important to focus on a certain segment for customer value creation. The customers of TNNL can be segmented into three groups based on their service attitude; the

³ <u>https://en.wikipedia.org/wiki/Technical_support</u>

low-, medium-, and high-end customer segment. The high-end customer segment is globally active in complex operation, a long planning horizon and an extended support infrastructure. In contradiction to the low-end and medium-end customer segment, the high end-customer segment wants to keep their asset relevant, upgrade, and optimize support solutions with a strong commitment to planning and set the trend for the other segments. Furthermore, their competence level of human capital is advanced. This service attitude requires high standards for service quality. The current study is limited to the Royal Dutch Navy in the high-end customer segment, which is the prime stakeholder of TNNL. Within the Royal Dutch Navy, the Directie Materiële Instandhouding (DMI) is responsible for the maintenance of ships, submarines and systems.⁴ They submit requests to the service desk and ask for technical assistance when necessary.

1.6 Research relevance and contributions

This study complements existing research in academic literature, by applying the SERVQUAL model (Parusaman et al., 1985) to the B2B and B2G context. The application of the model to the B2C sector contrasts sharply with the relative absence of studies employing it in a B2B and B2G context (Gounaris, 2005). Furthermore, research and theory lag the technological advances to improve service quality in this context (Pemer, 2020).

Practically, this study allows TNNL to shift away from their traditional service approach and to enact on IT for services. This research identifies service improvements to ensure a better service quality. This way, TNNL gets insights into the service providers and consumers' needs and wishes regarding suitable service levels. These insights help the front office to make strategic and tactical decisions about service improvements.

Finally, there is a high urgency for a sufficient quality of services. TNNL offers naval mission systems and radars with a lifecycle of approximately 30 years. This means that services are provided for a long period of time. Even at the end of the product life-cycle, services are offered as a best of effort. Taking this into account, it is evident that TNNL needs to pay attention to service quality.

1.7 Thesis outline

This thesis is divided into seven chapters. The current chapter, chapter 1, introduces the topic, problem statement, research questions, scope, and objectives of the study. The second chapter reviews literature on service quality to present a theoretical basis. The third chapter describes the methodology that will be used in this study. Chapter 4 and 5 present the quantitative and qualitative results of the study. Finally, chapter 6 is about the conclusion, discussion and directions for future research in this area. Figure 3 shows an overview of the research structure and methodology.



⁴ <u>https://www.defensie.nl/organisatie/marine/eenheden/directie-materiele-instandhouding</u>

Step	Introduction	Theoretical background	Methodology
Methodology	 Interviews Brainstorm sessions with Product Manager Services 	 Literature review Desk research Explanation of: Service quality IT services 	 Explanation of research design Description of participants Explanation of data collection and data-analysis process
Research question answered	What is the current business problem?	 What is service quality? Which dimensions are important in service quality? How is IT influencing service quality? 	
	Chapter 4	Chapter 5	Chapter 6
Step	Results I: SERVQUAL	Results II: VPC	Discussion
Methodology	 Survey Semi-structured follow-up interviews 	Workshop	 Theoretical and practical implications Limitations and directions for future research Conclusion
Research question answered	4) Which service quality dimensions offer room for improvement?	5) How can the front line workers of Thales enact on IT for improvement?6) Which actions does this require from the front office service management?	Main RQ: "How can the front office service of TNNL improve its service quality through IT?"

2. THEORETICAL FRAMEWORK

2.1 Service concept

Different authors have suggested distinct definitions for services. Wolak et al. (1998) identified four traditional characteristics of services: intangibility, inseparability, heterogeneity, and perishability. Intangibility refers to elements which cannot be touched, therefore services cannot be viewed as an object (Lovelock & Gummerson, 2004). The degree of intangibility has been proposed as a means of distinguishing between products and services (Wolak et al., 1998). With inseparability, service production and consumption occur simultaneously (Wolak et al., 1998). Simultaneous production and consumption means that the service provider is often physically present when consumption takes place (Moeller, 2010). The third characteristic of heterogeneity refers to a high variability in service delivery, as the service performance is delivered by different people and the performance of people can vary from day to day (Wolak et al., 1998). This heterogeneity can be a benefit and point of differentiation since it offers the opportunity for unique services that cannot be reproduced (Grönroos, 2000). The fourth characteristic is perishability, which suggests that services are "time dependent" and "time important" since services cannot be stored and carried forward to a future time period (Wolak et al., 1998).

More recent literature has questioned the unique service characteristics as mentioned by Wolak et al. (1998). Lovelock and Gummerson (2004) mention that this has to do with the development of new technologies, information technologies, applications, and automatization. In the past two decades, there has been a significant trend towards replacing labor by automation to improve productivity and achieve standardization in service delivery (Lovelock & Gummerson, 2004). This automatization results in less heterogeneity in service delivery. Furthermore, production and consumption of service delivery does not occur simultaneously influencing inseparability. In case of TNNL, the service can be offered remotely as well as physical. For remote service delivery, the service provider tries to solve issues or maintenance services from distance. With the help of camera's and photos, services can be easier delivered. Additionally, the line between products and services has faded by integrating services into core product offerings, called servitization (Olivia & Kallenberg, 2003). A well-known example is Rolls-Royce, offering aircraft engines as a service, rather than a product.

The criticism on the service characteristics shows that this might not seem the best way to define services. Another way for defining services can be found by dividing it into three components: the service concept, service system, and service process (Edvardsson & Olsson, 1996). Goldstein et al. (2002) mention that the service concept includes the service strategy of what to deliver and how the service delivery is designed. Furthermore, it is the core element of a service since it ensures integration between strategy and customer needs. Secondly, the service system contains the roles of people providing the service, technology, physical facilities, and equipment to deliver the service (Goldstein et al., 2002). The service system of

TNNL consists of several teams responsible for different service requests. The current project is limited to the requests fulfilled by the Customer Contact Center engineers (technical support). The engineers can be reached by e-mail or a request in the customer portal of TNNL. The service process describes the process and activities of how the service is produced and the relationship between the service provider and customer (Edvardsson & Olsson, 1996). Appendix A shows the service process of TNNL from the registration of a request till the closure of a request, in which the interaction between the customer and organization is key. Based on these foundations, the following definition for the current study is used: *"A service is a process consisting of a series of more or less intangible activities, that take place in interactions between the customer and service employees and/or physical resources or goods and/or systems of the service provider, which are provided as solutions to customer problems"* (Grönroos, 2007).

2.2 Service quality concept

Eshgi et al. (2008) define service quality as the overall assessment of a service by the customer. For the assessment of service quality, the interaction between the customer and organization is essential. According to Jänti et al. (2012), frequent communication between the service provider and consumer often means a better perception of the service quality. Furthermore, service quality is not only directly related to the customer's demand, it is one of the requirements for an organization to survive as well (Hong, 2015). Two main conceptualizations of service quality exist in the literature, one conceptualization is based on the disconfirmation approach, and the other based on a performance-only approach (Santos, 2003).

The disconfirmation approach sees service quality as a measure of how well the service delivered matches the customer expectations (Santos, 2003). For instance, Parasuraman et al. (1985) define service quality as "the comparison between customers' expectations and perceptions of service" (p. 42). The performance-only approach defines service quality as the overall evaluation of services that results from comparing the current positioning of the firm with the customer's expectations of how firms in that industry should perform (Santos, 2003).

Using these definitions, Parasuraman et al. (1985) developed the multidimensional service quality assessment tool, which is known as SERVQUAL. The SERVQUAL tool incorporates several dimensions for assessing the overall service quality. When assessing the service quality, the discrepancy between the organization's view and customer view of service quality can be visualized in the service quality gap model as illustrated in figure 4. Managing the service quality gap means that the firm has to match the expected service and perceived service to achieve service quality (Seth et al., 2004). The model is an analytical tool that enables management to identify service quality improvements from the viewpoint of the customer (Seth et al., 2005). The external focus contributes to the objectives of the study since TNNL lacks feedback from a customer perspective. Furthermore, the model consists of several service quality gaps. The main focus of the current study is on gap 4 and 5. Gap 4 describes

the gap between the service delivery of a company to customers, called the customercompany gap. The Dunning-Kruger effect might occur here, in which incompetent people tend to overestimate their own skill levels and competent people underestimate their own skill levels (Dunning, 2011). For instance, when the company perceives the service quality delivery lower than customers since they do not believe in their own competence to offer a good service quality. Gap 5 describes the gap between customer's expectations and current perception of services, called the customer gap (Siami & Goriji, 2012). Expectations are influenced by word-of-mouth communication, personal needs and past experience, like experiences with other service providers in the industry (Parasuraman et al., 1985). The service quality gaps can be measured through the service quality dimensions. The service quality dimensions will be further explained in the following section.



Figure 4. Service quality gap model (Parasuraman et al., 1985).

Another way to map the customer-company gap is through the value proposition canvas (VPC) as shown in Appendix A. The VPC is a simple and accessible way of researching whether the value propositions of a company matches with the actual needs of the customers, called the customer segment (Osterwalder et al., 2014). The customer segment is the external environment, the people a company aims to reach and create value for. The value proposition is the internal environment and is based on a bundle of services that create value for a customer segment (Hajiheydari, et al., 2019). The VPC points out the pains customers struggle with, the gains they strive for, held against the pain relievers and gain creators the organization offers. When you have designed a value proposition that addresses the

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customers' pains and gains, a problem-solution fit occurs between the two sides (Ostewalder et al., 2014). According to Sheehan and Bruni-Bossio (2015), the tool helps to assess whether the firm is underperforming and assists in providing recommendations for improvements.

2.3 Service quality dimensions

There are several service quality dimensions for researching the service quality gaps. LeBlanc (1992) indicates six factors of service quality in order of importance: corporate image, competitiveness, courtesy, responsiveness, accessibility, and competence. Grönroos (2000) proposes a service quality model based on seven criteria: professionalism and skills, attitudes and behavior, accessibility and flexibility, reliability and trustworthiness, service recovery, atmosphere, reputation and credibility. A well-known model in the literature is the service quality evaluation model (SERVQUAL). The SERVQUAL model was originally made of ten dimensions: tangibles, reliability, responsiveness, communication, credibility, security, competence, courtesy, understanding the customer and access (Parasuraman et al., 1985). The current SERVQUAL model is reduced to five factors since some dimensions were overlapping: reliability, responsiveness, assurance, empathy, and tangibles (Sachdev & Verma, 2004). The service quality dimensions are described in table 2.

According to Saravanan and Rao (2007), the service quality dimensions help with developing strategies that lead to customer satisfaction. Various studies focus on the link between satisfaction and quality, some think that quality leads to satisfaction and others support that satisfaction leads to quality (Negi, 2009). Parasuraman et al. (1985) argue that quality and satisfaction are both measured through the SERVQUAL model. The main reason for focusing on quality and satisfaction is improving the overall performance of organizations (Magi & Julander, 1996).

Service quality dimension	Description	Case study		
Tangibles	The physical evidence of the service such as equipment, physical facilities, and the appearance of both personnel and devices utilized to provide the service and to communicate to the consumer (Tazreen, 2012).	Communication tools for submitting requests in the case of TNNL are e-mail or the customer portal. Also the interaction moments and provided information to submit a service request can be seen as tangibles. The question is if the communication tools are suitable and whether the information provided and interaction moments are sufficient.		
Reliability	Relates to the ability to deliver the service in a dependable, accurate and transparent manner (Tazreen, 2012).	In the case of TNNL, reliability includes the fulfillment of promises communicated to the customer and the degree of transparency in the service process.		

Table 2. Service quality dimensions.

Responsiveness	The desire and willingness to assist customers and deliver prompt services (Tazreen, 2012). Parasuraman et al. (1985) refer with responsiveness to the exact time frame in which services will be performed, the promptness of service and the willingness to offer assistance.	In the case of TNNL, the question is whether they respond to services in an appropriate manner of time, their willingness to offer assistance and the frequency of communication on requests.
Assurance	Knowledgeable and courteous employees who inspire confidence and trust from their customers establish assurance (Tazreen, 2012). Assurance relates to competence, courtesy, resources, credibility and security (Parasuraman et al., 1985).	Safety and security are the main priority of business for TNNL for the delivery of Naval mission systems and radar solutions for the Naval domain. Assurance is not only important for their products, but also in the service process. Customers have to be assured that communication between them and TNNL is secured and feel save to share information. Additionally, customers have to be assured that employees have the necessary capabilities, resources and knowledge to meet customer requirements.
Empathy	The caring and personalized attention the organization provides its customers (Tazreed, 2012). This involves making effort to understand the customer needs by learning the customers' requirements and providing individual attention (Parasuraman et al., 1985).	In the case of TNNL, the question is if employees get into the skin of the customer to be able to propose what is needed and provide individual attention.

2.4 IT and service quality

According to Brennen and Kreis (2014) digitalisation refers to "the adoption or increase in use of digital or computer technology by an organization, industry, country etc." In this context, we place emphasis on the digitalisation of services, which changes the roles of operators in a value chain and creates new intermediates (Parviainen et al., 2017). For example, through direct access with customers or the increased use of mobile devices. The impact of digitalisation can be identified from the service quality dimensions as shown in table 3. Table 3 makes a distinction in three types of IT trends for services as described in the literature. Furthermore, table 3 describes its relation to the service quality dimensions. Additionally, it provides some practical examples of IT services in the B2B and B2G market to sketch the competitive landscape of services.

The notion of IT services has been increasingly recognized by researchers and practitioners (Santos, 2003). These new developments offer several benefits. First of all, IT services are new and apply creative ways to share their specialized competences, which results in a competitive service position (Chen et al., 2009). Furthermore, IT services can become an important source

to ensure customer loyalty and brand equity in business markets (Davis et al., 2008). Another benefit is the increased productivity. According to Tang and Todo (2013), IT services result in an improved availability, a reduced peer support, and drives continual improvement. By incorporating new service technologies, frontline workers can augment their work and provide more customized and blended services (Davenport & Kirby, 2015).

The literature describes different types of IT trends for services. Huang and Rust (2018) specify three types of artificial intelligences (AI) to engage customers in service: mechanical intelligence, thinking intelligence, and feeling intelligence. The intelligence of AI applications depends on the task to deliver the service. Some tasks are more difficult to mimicked by AI and take longer to develop successful AI applications for (Huang & Rust, 2018). Simple, standardized, repetitive, and routine service tasks, like the ordering of a spare part, do not need a high level of intelligence, called mechanical intelligence. A simple self-service system might be enough in this case. An example of a self-service system is a knowledge-based system. According to Tang and Todo (2013), a service desk needs to have a knowledge-based system nowadays. A knowledge-based system provides the opportunity for information to be collected, organized, shared, searched, and utilized (Tang & Todo, 2013). The collected information is helpful in incident management. According to Gupta et al. (2008), the objective of incident management is to resolve incidents as soon as possible with a minimum effect on the business performance and end user. With a knowledge-based system, information can be easily obtained in which requests can be solved by the customer itself or by the service desk in an appropriate manner of time. Furthermore, Parviainen et al. (2017) stated that an InstalledBase tool with respectable coverage is the basis for all industrial services. The InstalledBase tool may consist of up-to-date installation information, lifecycle plans, notifications, feedback and other material related to customer's systems. However, the creation of such a tool is time-consuming and comes with obstacles such as missing capabilities and resources (Parviainen et al., 2017). TNNL features an InstalledBase tool, but not a knowledge-based system to share, collect and organize information.

More difficult service requests require a thinking or feeling intelligence application. Thinking AI learns and adapts from data (Huang & Rust, 2021). Machine learning and data analytics are major thinking AI applications and can help service teams with out-of-the box predictive analysis for data processing (Huang & Rust, 2018). Moreover, it helps to discover patterns in data as the basis of personalisation for a customized strategy for service in terms of empathy (Huang & Rust, 2021). Furthermore, useful insights to improve workflows, response times and customer satisfaction can be collected from data that will be obtained (Kowalkowski et al., 2016). Additionally, data allows businesses to better understand process performance, cost drivers, and causes of risks (Parviainen et al., 2017). Real-time reports and dashboards on digital-process performance permit managers to address problems before they become critical (Markovitch & Willmott, 2014). A disadvantage of thinking AI in terms of empathy is that it cannot easily simulate intuition, has no conscious states, and no mind or subjective



awareness just as mechanical intelligence (Huang & Rust, 2018). Feeling intelligence is about recognizing and understanding other's people emotions and needs (Huang & Rust, 2018). It is the most advanced generation of AI, and current application to service are still a few such as chatbots and virtual agents (Huang & Rust, 2018). Most service requests including empathy are still performed by humans. Tasks that require a lower intelligence level should therefore be replaced first (Huang & Rust, 2021).

Furthermore, these AI applications allow a standardized approach of service delivery. According to Tang & Todo (2013), standardized methods and procedures are needed for efficient and prompt handling of services. As mentioned before, standardization is easier to reach when using IT, since service performance delivered by different people can vary from day to day (Wolak et al., 1998). For instance, the professional language varies by different service providers, which can be standardized through the use of IT. Another advantage of IT services in terms of reliability is that it provides a transparent doorway to the service oriented architecture (Devlin, 2006). For instance, everything can be documented and registered resulting in transparency. A disadvantage in terms of reliability for all IT services is that services offered on the internet are associated with online trust (Gerth & Heim, 2020). Especially, since TNNL works with sensitive data, trust and security are one of their main priorities.

Finally, the IT service management maturity model (ITSM), as shown in Appendix A, refers to the implementation and management of quality IT services that meet the needs of enterprises nowadays (Tang & Todo, 2013). The maturity model describes three different perspectives to consider when innovating service: (1) process, to ensure that everyone works according to the same guideline or in the same language and provide customer service that meets their expectations, (2) people, having the workforce that can deliver quality service, and (3) a suitable tool that meet all the requirements. These perspectives are considered in the current study as well.

Service quality dimensions	Mechanical intelligence	Thinking intelligence	Feeling intelligence	Practical examples
Tangibles	-Knowledge-based system (Tang & Todo, 2013). -InstalledBase tool (Parviaine et al., 2017).	-Machine learning; Data analytics (Huang & Rust, 2021).	-Chatbots; Virtual agents (Huang & Rust, 2018).	-ASML uses deterministic data to optimize maintenance and upgrade machines. ⁵ -IBM AI-virtual agent. ⁶

Table 3. Relationship between digitalized services and service quality.



⁵ <u>https://www.asml.com/en/products/customer-support</u>

⁶ <u>https://www.ibm.com/cloud/watson-assistant</u>

Reliability	 -E-services associated with online trust and confidentiality (Gerth & Heim, 2020). -A transparent doorway from end-to-end (Devlin, 2006). 			-Customer Portal of Philips Healthcare shows the		
				recent and historical		
		service requests, status.				
		reports, contracts, and				
				inventory lists to achieve		
				transparency. ⁷		
Responsiven	-Reduce peer support	-Insights in response	-Reduce peer support	-Easy online ordering of		
ess	and increase	times, customer	and increase	TERMA, automatically		
	availability (Tang &	satisfaction and	availability (Tang &	indicating which spare		
	Todo, 2013).	workflow	Todo, 2013).	part is required.		
		(Kowalkowski et al.,		-TERMA offers remote		
		2016).		service without visiting the		
		-Predictive analysis		site. ⁸		
		based on data (Huang		-24/7 support of Philips		
		& Rust, 2018).		Healthcare, ASML and		
		IBM.				
Assurance	-Higher availability of	-Standardized	-Standardized	-Customer Portal of ASML		
	information;	professional language;	professional	includes computer-based		
	Standardized	Higher availability of	language (Tang &	training and up-to-date		
	professional language	information (Tang &	Todo, 2013).	electronic information. ⁹		
	(Tang & Todo, 2013).	Todo, 2013).		-TERMA offers customers		
	-Knowledge is updated			up-to-date information of		
	in an ad hoc manner			the operational status,		
	and infrequently due			system state and keeps		
	to repetitive tasks			track of errors through an		
	(Engelberger, 1989).			app. ¹⁰		
Empathy	-Cannot stimulate	-Discover patterns in	-Recognizing and	-Feedback opportunities in		
	intuition, no conscious	data as the basis of	understanding	the customer portal of		
	state, mind or	personalization for	people's emotions	Philips Healthcare. ¹¹		
	subjective awareness	customized services	and needs (Huang &	-ASML data approach		
	(Huang & Rust, 2018).	(Huang & Rust, 2018).	Kust, 2018).	offering personal manuals		
		-Cannot stimulate		and work instructions		
		intuition, no conscious		everywnere.**		
		state, mind or				
		Subjective awareness				
		(nuang & Rust, 2018).				



 ⁷ <u>https://www.philips.nl/healthcare/services/onderhoudsservices</u>
 ⁸ <u>https://www.terma.com/services/sea/</u>

 ⁹ <u>https://www.terma.com/services/sea/</u>
 ⁹ <u>https://www.asml.com/en/products/customer-support</u>
 ¹⁰ <u>https://www.terma.com/services/sea/</u>
 ¹¹ <u>https://www.philips.nl/healthcare/services/onderhoudsservices</u>
 ¹² <u>https://www.heroes.nl/references/unique-data-approach-at-asml-a-different-view-on-data</u>

3. METHODOLOGY

3.1 Research design

To answer the proposed research question and sub questions, see chapter 1, a mixed-method study was executed at TNNL. Literature shows that the SERVQUAL model is an objective evaluation tool to measure the quality of services used by different researchers (Landrum et al., 2011). However, there is no clear measurement procedure for the assessment of service quality regarding this model (Seth et al., 2005). Whereas most scholars apply the SERVQUAL model in a quantitative way to study service quality, the current study applied the model in both a quantitative and qualitative way. The use of a combined approach resulted in strategic insights as well as a better understanding of the service quality from different perspectives (Lyndall et al., 1994). Furthermore, the small sample size made it easy to perform the study both ways.

The study started with collecting quantitative research data by means of an online survey. The survey used service perception as a measure of perceived service quality. Follow-up interviews covered the motivations behind the ranking of statements in the survey and provided the opportunity to determine the requirements for suitable service levels from different perspectives.

Next to the survey and follow-up interviews, a Customer Value Discovery workshop is held with customers. Albrecht and Austin (1999) describe value modelling as a special method for discovering critical success factors for any organization by eliciting views of a group in a structured feedback meeting. A major difference between this methodology and the SERVQUAL model is that there are no predefined survey questions to discuss, but the process starts with a blank sheet and allows customers to describe their own voice towards service quality. The Customer Value Discovery workshop was based on the customer segment of the Value Proposition Canvas (VPC), in which customers point out their jobs, the pains they struggle with and the gains they strive for in their professional life as described in the results section.

Finally, organizational staff are brought together in a final workshop based on the value proposition of the VPC to consider actions for services that would either reduce the pains of customers or reach the required gains of customers to get their jobs done. The tool makes value propositions visible and tangible (Ostewalder et al., 2014). Moreover, the tool makes it easier to discuss and manage the gap or alignment between customers and the organization to create services customers want (Kyhnau & Nielsen, 2015).

3.2 Procedure

Respondents were invited to participate in an online survey, follow-up interview and workshop by the means of an e-mail, which contained information about the research,

indicated duration of the survey (i.e., 5-10 minutes), date and duration of the interview (i.e., 30-45 minutes), and workshop (i.e., 60-90 minutes). By an agreement of the appointment, they agreed upon participating in the research. If respondents did not want to participate, they would simply not accept the invitation. In total, 11 interviews were conducted face-to-face and 6 interviews through a videoconference. The two workshops were conducted at the Royal Dutch Navy in Den Helder and the head office of TNNL in Hengelo.

The first phase for all 17 respondents consisted of a survey. Respondents were asked to indicate their perceptions regarding various dimensions of service quality. The survey is administered in Word and send back to the researcher to comply with the security policies of TNNL. Thereafter, participants from the internal organization are invited for an individual follow-up interview. The survey provided a guideline for the follow-up interviews, in which participants explained their choices and provided additional feedback regarding their expectations towards service quality.

After the internal interviews, the customers were visited. The visitation at the Royal Dutch Navy consisted of two parts. First of all, a Customer Value Discovery workshop is held with four customers. For the workshop each participant got three colours of post-its, one for the jobs-to-be done, one for the gains, and one for the pains in the customer segment of the VPC. The workshop started with the jobs the customers are trying to get done in their work followed by the gains and pains. The meaning of gains is which outcomes the customers expect from working together with the service desk TNNL. Gains can help them in fulfilling their jobs. The pains are the obstacles customers experience in their job in collaboration with the services the company offers. Each participant was able to write down their own jobs, pains and gains. Afterwards, the jobs, pains and gains were discussed and the main components were prioritized by the customers. The second part consisted of individual interviews with customers to discuss the survey and expectations towards service quality. In the individual interviews was noticed that most points were already discussed during the workshop. This confirms that the service quality dimensions in the survey cover the most important aspects related to service quality.

Finally, a workshop is held with the front office service management to consider actions for services, which consisted of four participants. The workshop consisted of two parts. In the first part, a presentation is provided by the researcher about the results from the interviews, survey and Customer Value Discovery workshop. Furthermore, to make the management aware of the possibilities of IT services, the researcher provided suggestions to improve the service quality with the facilitation of IT (table 3, p. 21). The second part of the workshop consisted of an interactive session about the value proposition of the VPC. Each participant received three post-its. The participants had to write down the services the company could offer customers to perform their job and how these services are gain creators and pain relievers for customers. Afterwards, the outcomes were discussed and it was decided which

of these outcomes could be realized at a short-, medium- and long-term as shown in figure 8 (p. 39). An overview of the research procedure is shown in figure 5.



Figure 5. Research procedure.

3.3 Measurements

The following section describes how the survey measured the respondent's perceptions of service quality. The five service quality dimensions used in the current study are: tangibles, reliability, responsiveness, assurance, and empathy (SERVQUAL). The literature analysis has proven the effectiveness of using these dimensions. The initial items of the SERVQUAL model are modified and additional items are included together with the front office management to measure the perceived service quality in the current context. Based on the revision, 20-items were adopted to the study in order to identify the dimensions that matter most. The respondents had to rank the items on 5-point Likert scale (1 = completely agree, 5 = completely disagree). All items are reported in table 4.

5 dimensions	20 items
Tangibles	1. Thales has suitable communication tools to submit requests.
	2. There are enough interaction moments in the service process between
	Thales and customers.*
	3. The information required to submit a request is clear.*
	4. Thales responds with its communication tools to IT trends in the market.*
Reliability	5. Thales provides its services at the time promised to do so.
	6. There is transparency in the service process.
	7. Thales does what has been communicated to customers.
	8. Thales shows a sincere interest in solving complaints.
Responsiveness	9. Thales is never too busy to respond to service requests.
	10. Thales responds to service requests in an appropriate manner of time.
	11. Thales makes information easily obtainable for customers.*
	12. Thales frequently communicates about updates in the service process.*
Assurance	13. Customers feel safe in their transactions for services.
	14. Thales has the knowledge to answer the service requests.
	15. Thales commits the necessary resources to service quality.
	16. Thales has the necessary capabilities to meet customer requirements for
	service.

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Tahle A	Service	nualitv	dimensions	and items	(Fnglich	translation)	1
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Empathy	17. Thales gives customers individual attention.
	18. Operating hours are convenient for providing services.
	19. Thales understands the specific needs of customers.
	20. Thales is easily accessible for service requests.*

*Statements created in accordance with the front office service management.

3.4 Respondents

In the literature of strategic management, there are three layers of control defined in organizational structures: strategic, tactical, and operational (Calimli et al., 2014). Next to these three layers of control, customers and employees from sales/marketing participated in the current study. These different stakeholders were involved to get a wide range of different perspectives. In total, 17 participants completed the online survey and were involved in the follow-up interviews. Of these 17 participants, 10 were male (58.8%) and 7 were female (41.2%). Most of the participants were 30-50 years old (N = 10). The characteristics of the sample are reported in table 5.

		Ν	%
Gender	Male	10	58.8
	Female	7	41.2
Age	< 30 years	1	5.88
	30 – 50 years	10	58.8
	> 50 years	6	35.3
Stakeholder segment	Strategic	2	11.8
	Tactical	3	17.6
	Operational	3	17.6
	Sales/Marketing	5	29.4
	Customer	4	23.5

Table 5. Characteristics of the sample.

Strategic

The strategic level of TNNL deals with decisions related to what you want to achieve on the long term to ensure service quality. Two strategic managers volunteered to participate in the current study. Both managers are working on a plan of action and goals for services in the future and perceive this study as an important basis for these plans. With the inclusion of the strategic layer of the organization, the long term is taken into account.

Tactical

The tactical level of TNNL translates the strategic direction into deliverable activities. Supply chain and service design are important for the strategic direction for services, they define the entire service process including every stage from a request to closure. Recently, the customer

portal is introduced to support the goal of a more transparent service process defined on a strategic level. In the current study, three participants volunteered to participate.

Operational

On an operational level deliverables are implemented and achieved via initiatives. This level embodies actions and functions to sustain specified plans (Calimli et al., 2014). In the case of TNNL, the operational level consists of Customer Contact Center engineers delivering technical support. They are the single point of contact for customers, therefore, they have a great impact on the service quality perception by customers.

Sales/marketing

Next to the strategic, tactical and operational layer, it is important to consider the view of sales and marketing. At TNNL, marketing is responsible for the promotion of services and is dealing with the competitive market of services. Sales is responsible for logistic support, such as the service contracts, spares and repairs. Marketing and sales have a close relationship with customers and are therefore considered in the current study as well.

Customer

Finally, the customers in the current study consist of the Royal Dutch Navy maintenance organization. The customers are the prime stakeholders of TNNL and have contact with the service desk for support. Customers drive revenues and with a good service quality, it becomes likely to purchase more and other systems in the future of Thales. Therefore, it is an important stakeholder to consider for research towards service quality.

3.5 Data analyses

Carrying out quantitative research involves some quantitative analyses. The SPSS package is used for the analysis of the quantitative results. Before the data was entered to SPSS, the data was anonymized to comply with the security policies of TNNL. From the observations, it is unlikely that there is a normal distribution since the sample is small. Therefore, non-parametric tests are executed, the most common is the Kruskal Wallis test. Furthermore, mainly descriptive statistics are used involving the means to compare the differences between groups.

The focus of the current study is on the qualitative results. The interviews with the strategic, tactical, operational layer and customers are fully transcribed. The interviews with sales and marketing are summarized, including main quotes, since the goal of these interviews was to retrieve more background information. After transcribing and summarizing the interviews, a first round of open coding was executed to identify people's perceptions and expectations towards service quality. The open coding resulted in a list of 47 codes (e.g. lack of feedback on the status of requests to customers; sharing knowledge is important for customers). Thereafter, a second round of axial coding was executed to reveal categories and



subcategories within these codes. This resulted in 18 subcategories (e.g. status updates; integrated collaboration). All subcategories could be traced back to the five service quality dimensions defined in the literature by Parasuman et al. (1985). This last round of coding revealed the final process. To establish the reliability of the coding, an independent coder reviewed the codes and inconsistencies were discussed. The next paragraph shows the results of the coding process with quotes from the participants. The whole coding process is administered in Excel to comply with the security policies of TNNL.

Finally, the analysis of the workshop was straight-forward. Since the participants themselves ranked the critical success factors for service quality within the workshop, the most critical factors were already identified. The critical factors and proposed services from the management to match the value proposition of the company with the customer needs are illustrated in figure 9 (p. 41).

4. RESULTS I: SERVQUAL

4.1 Quantitative results

To identify the service quality gaps for improvement several analyses were conducted. First, an analysis of outliers was made. The lowest value of 1.25 for the tangibles dimension and 1 for the empathy dimension both for case number 3 on an operational level were identified as outliers. However, the case is not deleted since this would result in a decrease of statistical power.

Second, a Shapiro-Wilk test is performed to assume if the data is normally distributed or not because a small sample of 17 participants is used in the current study. The results show that tangibles, p = .247, reliability, p = .699, responsiveness, p = .261, assurance, p = .8, and empathy, p = .292, are all greater than .05, which assumes the data is not normally distributed. Therefore, non-parametric test are used for the analysis through a Kruskal Wallis test. There is a statistically moderate significant difference between the rank ordering of responsiveness by the different stakeholder segments of TNNL (H(4) = 8.23, p = 0.083), with a mean rank of 3.38 on a strategic level, 3.33 on a tactical level, 2.92 on an operational level, 3.4 from marketing and sales, and a 2.5 by customers as reported in table 7. The qualitative section will explain the difference in the rank ordering of responsiveness.

Although there are no significant differences found in the other service quality dimensions by the different stakeholder segments, the results presented give insight into the small variations from different perspectives. There is a distinction made in the service quality perception from an external and internal viewpoint. The average scores for tangibles, reliability, responsiveness, assurance, and empathy were taken. The results are reported in table 6 and illustrated in figure 6 in a Bernstein spiderweb. A notable difference between the internal and external environment is found between responsiveness and assurance. The external environment perceives responsiveness and assurance better in relation to the internal environment. The Dunning-Kruger effect might occur here, in which competent people, in this case the internal environment of TNNL, tend to underestimate their own skill level to deliver a good service quality (Dunning, 2011).

-			
Dimension	Internal	External	
	N = 13	N = 4	
Tangibles	2.44	2.44	
Reliability	2.69	2.31	
Responsiveness	3.27	2.5	
Assurance	2.88	2.19	
Empathy	2.31	2.1	

Table 6. Average scores of the service quality dimensions.

Note. Scores are rated on a scale from 1 (= Completely agree) to 5 (= Completely disagree).



Figure 6. Bernstein spider web of the internal and external perception of service quality.

Third, to narrow the results, the average scores per stakeholder segment on the different service quality dimensions were taken. The results are reported in table 7 and illustrated in figure 7. A notable difference is found between the strategic point of view in relation to tactical, operational, sales/marketing and customers. The strategic team points out that improvements lay in the tangibles dimension. Furthermore, all respondents perceive responsiveness as the main dimension for improvement on a scale from 1 to 5. The qualitative section will explain the results of the survey through the follow-up interviews.

			Internal		External
Dimension	Strategic	Tactical	Operational	Sales/Marketing	Customers
	N = 2	N = 3	N = 3	N = 5	N = 4
Tangibles	3.38	2.5	2.17	2.6	2.44
Reliability	3	2.67	2.33	2.8	2.31
Responsiveness	3.38	3.33	2.92	3.4	2.5
Assurance	2.88	3	2.67	2.95	2.19
Empathy	2.5	2.33	1.75	2.55	2.1

Table 7. Average scores for the service quality dimensions per stakeholder segment.

Note. Scores are rated on a scale from 1 (= Completely agree) to 5 (= Completely disagree).



Figure 7. Bernstein spider web of the service quality perception per stakeholder segment.

4.2 Qualitative results

The following section describes the results from the follow-up interviews based on the five service quality dimensions: tangibles, reliability, responsiveness, assurance, and empathy (SERVQUAL).

4.2.1 Tangibles

First, the interviews revealed participant's perspective towards the tools for services and touchpoints in the service process. Recently, the customer portal is introduced as a mean to register, manage and monitor requests till its closure. The participants have high expectations of the customer portal. Respondent 10 (marketing) stated: *"The portal is a great opportunity to share more information."* Respondent 2 (sales) mentioned that the information to share via the portal might replace manuals and information packages delivered together with the radar systems since these often disappear at Naval ships. Similarly, respondent 17 (customer) mentioned: *"The portal could make information available, I would like to see more logistics, the availability of components and prices."* Another benefit according to respondent 16 (customer): *"There is more distance by e-mail than the customer portal since you have to ask for an update by e-mail, while the portal is always accessible."* The same respondent mentioned the touchpoints for interactions: *"I would like to receive a warning by e-mail when information related to a request is uploaded in the portal."*

In relation to other participants, the strategic team is more critical towards the portal. Respondent 13 (strategic) mentioned: *"We have the right tool, but do not implement it the right way. With the portal, the service delivery should become more process dependent instead of person dependent. The status of requests, the person handling the request, and the activities this person takes should be visible to make sure that someone else can take over his task."* Also respondent 11 (strategic) mentioned: *"We have a long way to go before we can implement the portal the way we want. The spot on the horizon will be a similar tool to bol.com, in which*

customers can order spare parts and get insights into stock. We can do a lot more when the portal is connected to our ERP-system and becomes an end-to-end solution." The critical view of the strategic team might explain the gap in terms of tangibles in relation to the other participants as shown in figure 7 of the quantitative analysis.

Moreover, multiple customers mentioned that remote assistance through videoconferences would be a great additional IT service tool. Respondent 15 (customer) stated: *"Remote assistance through a videoconference gives the opportunity to share drawings and photos"*. The benefit of video conferences for remote assistance is mentioned on a tactical level as well. Respondent 8 (tactical) stated: *"Videoconferences help us to find a solution since we can see it with our eyes and we do not depend on a single description."* Finally, multiple participants emphasized on the importance of the service desk because it provides a single point of contact to customers.

Categories	Subcategories	Open codes
		 Participants prefer video remote assistance
	IT service tools	 In the future a similar service tool comparable to bol.com
		is preferred by the strategic team
		 Make information accessible through the portal for
Cust Tangibles		customers (e.g. books and information packages)
	Customer portal	 Portal should be connected to the ERP-system to create
		an end-to-end solution
		 The portal is accessible for customers at any time
		 Interaction between customer and service desk should be
Touchpoints		process dependent instead of person dependent
	Touchpoints	 Customers prefer updates by e-mail and portal
		 Service desk is important as the single point of contact for
		customers

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4.2.2 Reliability

Next to tangibles, the interviews revealed how the participants perceive the reliability of the service desk. To illustrate the participant's view on promises regarding time respondent 12 (sales) stated: "Customers ask for a time limit, as an organization we do something else". Similarly, respondent 9 (sales) mentioned: "Technical people tell customers that the problem will be solved soon, in practice it takes longer." Respondent 13 (strategic) mentioned that it is important to be honest when something takes longer than expected: "honesty about the status of the service process creates transparency." In addition, respondent 8 (tactical) mentioned: "When there is a problem and we cannot solve it, we have to be transparent and search for alternatives together with customers."

Finally, both the internal and external environment argued that the customer portal contributes to transparency. For instance, respondent 4 (tactical) mentioned: "When customers have access to the customer portal, they can follow the process of requests." Also respondent 15 (customer) mentioned: "I can take a look in the customer portal without contacting the service desk to keep an overview of requests." However, respondent 1 (operational) stated: "The question is what we report in the portal, if we do not share information or feedback, the service process is not transparent."

Categories	Subcategories	Open codes
		 Response times do not comply with the time promises to
	Time promises	customers
		 It takes more time to solve a service request by the service
		desk in practice
Reliability		 Sharing information creates transparency
		 Look for alternatives together with customers in case of
	Transparency	problems
		 Being honest to customers about the process is important
		 Customer portal contributes to transparency

Table 9. Perception and expectations of the reliability dimension.

4.2.3 Responsiveness

The third theory-driven category is responsiveness. All participants perceived responsiveness as the main dimension for improvement in the quantitative part (table 7). The problem statement already described an ad hoc an reactive service process. This is confirmed in the interviews. Respondent 8 (tactical) described the service process as: *"We register what customers wanted yesterday, while we have to register what customers want tomorrow."* Similarly, respondent 11 (strategic) stated: *"We are waiting for incidents or questions before we operate, therefore, we are not proactive."* This way, TNNL is fighting fires instead of being proactive. In addition, respondent 13 (strategic) mentioned that TNNL is a late adopter towards the implementation of IT services in relation to the B2B and B2C market: *"Many companies have a portal to register and monitor the service process, we are not the trendsetters or the followers, but we are a late adopter"*.

According to respondent 14 (customer): "The lead time, feedback and updates are crucial points in terms of responsiveness." Respondent 15 (customer) confirmed the lack of responsiveness on requests: "Sometimes there is a lack of feedback regarding the status of requests." However, there is a lack of awareness on an operational level regarding status updates. Respondent 1 (operational) mentioned: "If I take a general look at how often a customer asks for a status update, I wonder whether customers have a need for status updates." Respondent 12 (sales) mentioned as a reason on the lack of status updates: "The

human conclusion is, if there is no new information available it means that we do not have to communicate. In fact, we have to keep customers updated that we are working on it." Respondent 8 (tactical) stated: "We have to determine how long a request can be open without informing customers." In addition, customers feel like there is a lack of information to find a quick answer to a request. Respondent 15 (customer) indicated: "More technical information could help me to solve an error by myself without contacting the service desk". Respondent 17 (customer) confirmed this: "In-depth technical information could help me to find a quick solution, however Thales is not willing to share this information."

In regard to response times, there is a difference observed in the interviews by having a service level agreement (contract) or not (on-demand). Respondent 17 (customer) mentioned: "*The response time for requests based on a service contract are sooner fulfilled in relation to on-demand requests.*" *Respondent* 14 (customer) noticed that the response time is long without a service contract as well. He mentioned: "*Sometimes I have a question or incident that has priority, especially for a sailing unit I would like to receive an answer within one day, this often takes long. I would like to see a solution strategy for a ship ashore within two weeks.*" Respondent 13 (strategic) mentioned: "*We have to discuss internally what the response time is for both on-demand and service level agreements to handle both discreetly.*" Respondent 9 (sales) argued that a faster service delivery can be accomplished if there is a larger budget among customers. On average customers perceived responsiveness better compared to the internal respondents as shown in figure 6 of the quantitative analysis. The main reason as provided in the interviews by customers is that TNNL has comparable response times compared to other suppliers. Moreover, respondent 14 (customer) stated: "*A response to real problems should be fulfilled within one day and this is the case in my experience.*"

Categories	Subcategories	Open codes
		 Service desk waits for service requests
	Reactivity	 Service desk registers the past instead of the future
		 TNNL is a late adopter of IT services
		 Lack of feedback on the status of requests to
		customers
Responsiveness	Status updates	 No new information means not communicating with
		the customer
		 The service desk should determine the duration of
		open cases without updates
	Availability	Customers indicate a lack of technical information
	of information	 Limited information available for fast response
		according to customers

Table 10. Perception and expectations of the responsiveness dimension.

	Customers perceive a difference in response time
	for on-demand and a service level agreement
	Customers prefer a solution strategy for a ship
Response time	ashore within 2 weeks
	Customers prefer a solution strategy for a sailing
	unit within 1 day
	• Customers perceive comparable response times of
	TNNL compared to other suppliers

4.2.4 Assurance

Assurance is the fourth category derived from the literature. First of all, customers feel safe to share information. Respondent 12 (sales) mentioned that it is important that customers feel safe to share information because the more information customers share, the easier the job becomes of the service desk: *"I believe customers feel safe to share information regarding requests, they have to, otherwise we cannot fulfill requests entering the service desk."* Regarding remote assistance, safety is the major obstacle for implementation. Respondent 15 (customer) mentioned: *"Remote assistance through videoconferences would be a plus, but it should be responsible including a secured connection."*

Furthermore, customers noticed resource and knowledge problems at TNNL. Respondent 14 (customer) mentioned: "We experience that engineers behind the service desk have to collaborate often with experts who are part of the development team to find an answer to our request, but the availability of experts is small to find a solution. We believe Thales has the *right resources, but these are not always available."* TNNL confirmed this and provided several reasons for it. According to respondent 8 (tactical): "The development team is extremely buzzy with the development of new radars for naval, they do not have the time to answer questions from the service desk." Another reason described by respondent 11 (strategic): "There is no separate flow for services, we depend on the bigger programs for resources, who are part of the development team". Moreover, TNNL struggles with a loss of knowledge due to retirements. Respondent 1 (operational) mentioned: "We have a lot of old systems in the field and the knowledge of these systems disappears because of retirements, this makes it difficult to solve requests regarding old systems in an appropriate manner of time by the right people." Respondent 16 (customer) mentioned experience with resource and knowledge problems as well: "We are struggling with keeping the knowledge updated and finding the resources we need as well." The recognizable situation of a lack of resources by the customer itself might explain why customers perceive assurance better in relation to TNNL as shown in figure 6 of the quantitative analysis (p. 29).

Additionally, respondent 14 (customer) experienced a difference in competencies between experts and engineers behind the service desk. Respondent 14 (customer) stated: *"An expert*"

understands my question, there is more confusion when I talk to an engineer behind the service desk." Engineers confirm this. Respondent 5 (operational) stated: "Customers have a certain formulation that experts understand easily, while the Customer Contact Center Engineers do not understand." Moreover, engineers behind the service desk feel sometimes just a conduit for requests. Respondent 3 (operational) mentioned: "Sometimes I feel like a conduit between the customer and expert of the development team, this makes me unhappy since I am originally a technician." According to respondent 2 (sales) the question is what kind of service desk TNNL wants to be. Respondent 2 (sales) stated: "Do we want to be a service desk where engineers retrieve information from the internal organization, called the experts, or do we want to be a service desk with engineers capable of answering request for 80% including field experience?"

Finally, customers and TNNL provided interesting suggestions during the follow-up interviews in terms of assurance. These suggestions were taken together and called "integrated collaboration" as shown in table 11. First, customers believe that sharing knowledge between TNNL and customers result in a better service delivery. Respondent 17 (customer) mentioned: "As a maintenance organization we have a lot of knowledge, sharing this knowledge could help Thales and ourselves." Second, respondent 14 (customer) described: "I prefer shorter lines of communication to the development team to get an answer in an appropriate manner of time." The operational level described that gaining experience from experts might help the service desk to answer requests in an appropriate manner of time. Respondent 3 (operational) mentioned: "Gaining experience from experts of the development team might help to gain knowledge of systems and to understand who we have to approach in the internal organization to fulfill requests." Finally, respondent 8 (tactical) stated: "There should be alignment between product and services to deliver services in an optimal way. The tactical level described that TNNL has to decide how services are connected to products and that product development has to pay attention to services to improve the service quality of TNNL.

Categories	Subcategories	Open codes
	Safety	Customers feel safe to share information
		 Remote assistance should fit the security standards
		Experts understand the formulation of customers easier
	Competencies	compared to Customer Contact Center engineers
		 Customer Contact Center engineers feel like a conduit
Assurance		between customers and experts
F		Necessary resources for the service desk are part of bigger
	Resources	programs of TNNL
		 Lack of knowledge of the old systems by TNNL
		Lack of available experts at TNNL

Table 11.	Perception a	and expectations	of the assurance	dimension.

	 Sharing knowledge is important for customers
Integrated	Customer Contact Center engineers want to gain product
collaboration	experience from experts
	Shorter lines of communication with production expected
	 Alignment within the organization of TNNL

4.2.5 Empathy

The final category is empathy. Respondent 13 (strategic) stated: "As a high-tech company we focus on the hard skills, but the soft skills are important for creating empathy." The respondent meant that TNNL has to listen to customers and keep close contact with customers throughout the whole service process. Respondent 9 (sales) mentioned: "Customer contact must be priority number one." The strategic, tactical and sales/marketing point of view admits that the customer contact dilutes in the service process. This is confirmed in the previous dimension of responsiveness, where customers indicated the lack on the status of requests.

Furthermore, participants describe that the customer portal provides no individual attention in terms of empathy. For instance, respondent 16 (customer) mentioned that the customer portal can become more personalized: *"When I enter the portal, I would like to see which systems are in use and what are the open requests instead of a general picture. Similar to the portal of my car garage showing past maintenance and license plate."* Similarly, an automatic e-mail from the customer portal to customers is very standard. According to respondent 1 (operational): *"An e-mail to customers from the portal is standard and excludes an explanation of long lead times, which results in a certain perception by the customer."*

Furthermore, customers would like to see an advising or consultancy role from TNNL. The company confirmed this. Respondent 11 (strategic) mentioned: *"From time to time you have to give customers feedback, providing advice and counteract. I am not sure if this happens sufficiently."* Respondent 8 (tactical) stated that the focus should be on services for the future in this consultancy role. For instance, he mentioned: *"We talk about the functional parts with customers, but we do not talk about the services customers expect to have in 2030, therefore we cannot prepare for the future."* Similarly, customers indicated to get insights into future plans by TNNL. Respondent 16 (customer) described: *"We want to know the future plans regarding systems and services, this way we can anticipate on it."* Additionally, respondent 8 (tactical) described a lack of awareness of services: *"Everyone should be aware of the importance of services, the service process ends after the life cycle of a product."* Respondent 12 (sales) confirmed this: *"The awareness in the area of services must increase, everyone should feel responsible for delivering a good service."*

Finally, a reoccurring question during the interviews was the preference for a 24/7 service desk. Respondent 5 (operational) mentioned: *"Most requests fall within our 8 working hours*

and therefore we do not experience any problems with different time zones." However, respondent 10 (marketing) stated: "A 24/7 service desk creates a certain appearance to the outside world, it could be an added value or unique selling point." According to respondent 11 (strategic): "In my opinion a 24/7 service desk is more customer friendly. I think this is possible with digital answers or video answers." Moreover, customers like a single point of contact for services. Respondent 15 (customer) stated: "A single point of contact is one person I can speak to in case of problems, incidents, questions or if things do not go as planned, this person has to take care of it."

Categories	Subcategories	Open codes				
	Presence	Customers like the single point of contact				
		 24/7 support of the service desk could be an added-value 				
	Dialogue	• TNNL should fulfill a consultancy role (e.g. future services)				
		 There should be more focus on soft skills by TNNL 				
		TNNL should feel responsible for services				
Empathy	Awareness	 TNNL should be aware that the service process ends after 				
		the life-cycle of a product				
	Communication	TNNL should listen carefully to customers				
		Contact between customers and TNNL dilutes in the				
		service process				
		 Customer contact must be priority number for TNNL 				
	Individual	Personalized dashboard in the customer portal				
	attention	 Personalized e-mails from the customer portal to 				
		customers				

Table 12. Perception and expectations of the empathy dimension.

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5. RESULTS II: WORKSHOP

The following section describes the main results of the internal and external workshop. Figure 9 (p. 41) shows the VPC of the workshop.

5.1 External workshop

The external workshop was held with customers involving the customer segment of the VPC. Most of the pains and gains highlighted in the customer segment are already discussed in the qualitative part of the interviews. This section summarizes the main pains and gains related to the customer jobs as indicated in the workshop.

Customer jobs

The customer jobs describe what customers are trying to achieve in their professional lives (Ostewalder et al., 2014). The main customer jobs consist of advice for complex errors at ships since the customers form the point of contact for customer issues at ships. For this, they collaborate with TNNL (service desk) and on an international level. Furthermore, an important job is the preservation of knowledge and materials. The maintenance organization has to make sure that they possess the right people with the right skills and knowledge for the maintenance of systems, submarines and ships. Additionally, customers are working on the future and try to develop a vision for it.

Gains

The gains are results or benefits that customers desire of the customer support (Ostewalder et al., 2014). First, they would like to create an integrated collaboration between TNNL and customers as mentioned before in table 11 (p. 36). With an integrated collaboration, customers expect that the desire for knowledge sharing and retention, shorter lines of communication, a quick solution and frequent status updates will be fulfilled. The motivation for an integrated collaboration as indicated by the customer is that TNNL and the Royal Dutch Navy (customer) depend on each other. Customers have a certain degree of knowledge of systems, while TNNL can help customers with anticipating on the future of products and services by sharing information. Additionally, customers prefer a single point of contact for requests as mentioned in table 12 (p. 37).

Pains

The customer pains are conditions which either prevent the customers from getting the job done or elicited negative emotions before, during or after a job (Ostewalder et al., 2014). First, customers experience negative emotions due to the interface of the customer portal as indicated before in table 8 (p. 31). Second, improvements can be made in regard to long lead times and communication, in particular the back-channeling, as already indicated in the responsiveness part. Third, the pain "clarity in vision" corresponds to an integrated collaboration to get insight into future plans of systems and services. An additional code discovered in the workshop is related to bureaucracy. Customers indicated that both

organizations (DMI and TNNL) are bureaucratic involving complicated rules and processes that make the service process slow.

5.2 Internal workshop

The second workshop is held with organizational staff about the value proposition of the VPC. The organization staff formulated how to match their value proposition with the customer needs. First, the proposed services by organization staff are highlighted. Second, the associated gain creators and pain relievers are discussed.

Services

To match the services with customer needs, there are several actions to take on the short term according to the participants. First, more attention should be paid to the user interface of the customer portal. Organization staff suggested real time customer dashboards, access to frequently asked questions (FAQ), feedback opportunities, and manuals per system in the portal. To respond to the facilitation of IT for service quality, the portal serves in this way as a knowledge-based system to retrieve and share information. In this way, the first step to mechanical intelligence will be made. Also a step towards thinking intelligence can be made with the use of data for the implementation of real time customer dashboards. Moreover, remote assistance was considered as a benefit during the interviews to find a quick solution. Additionally, to respond to the desire for more collaboration, user groups are suggested. On the midterm, the integrated collaboration could be further exploited. Organization staff suggested an integral international approach through a forum instead of individual service contracts. On the long term, the portal should become similar to a webshop including easy online ordering and insights into stock. An extra feature in terms of feeling intelligence would be the implementation of a chatbot as the point of contact for customers. In short, most services could be implemented in a digital way to match the value proposition of TNNL with the customer's needs and wishes as shown in figure 8.



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Gain creators

The proposed services on the short-, medium- and long-term by organization staff result in several gain creators. First, a knowledge-based system provides the opportunity for one central place with information. It makes knowledge sharing easier and increases the independency of customers. This way, the objective of incident management can be reached by solving incidents as soon as possible with a minimum effect on the business performance and end user (Gupta et al., 2008). Second, TNNL creates more involvement, empathy and shorter lines of communication for customers with real time dashboards, more feedback opportunities, user groups and remote assistance. Additionally, with a chatbot, the service desk is available 24/7 in a digital way. Moreover, it becomes likely that a quick solution to requests can be found with the implementation of these services.

Pain relievers

Finally, the proposed services result in several pain relievers. With the extension of the portal and knowledge-based system there is more transparency in the service process. Moreover, the opportunity in the portal to add feedback is closing the feedback loop. Additionally, periodic updates in the portal enhance the interaction and collaboration. As mentioned before, Jänti et al. (2012) argue that frequent communication between the service provider and consumer often means a better perception of the service quality. In short, the proposed IT services help customers to get an answer to their requests in a more transparent way, including regular interactions with the service desk for a better service quality.



Figure 9. Value Proposition Canvas (VPC).

6. DISCUSSION

This chapter describes the theoretical and practical implications of this study. Thereafter, the limitations of this study and recommendations for future research are discussed. Lastly, the conclusion of this study is stated.

6.1 Theoretical implications

This study contributes to the literature in various ways. First, this study adds to the research on service quality in a B2B and B2G context. According to Janita and Miranda (2013), one area that is relatively under-researched in the service quality literature is B2B service quality. Most studies in the area apply to B2C situations (Huang et al., 2019). Moreover, researchers find it difficult to measure service performance and quality in a B2G setting due to exposure restrictions in this context (Finkenstadt, 2020). Additionally, the application of the SERVQUAL model to the B2C sector contrasts sharply with the relative absence of studies employing it in a B2B and B2G context (Gounaris, 2005). However, Tang et al. (2013) argue that perceived service quality is an important factor in the B2B and B2G environment. Therefore, this study aimed to provide further evidence for the application of the SERVQUAL model to explore service quality in a B2B and B2G service setting.

Second, this study adds to the research on digitalisation of services, in particular IT services. Many enterprises have been moved or are planning to switch to IT services to deal with the dynamic and constantly changing environment (Taherdoost et al., 2013). Therefore, the literature starts to pay more attention to IT services. However, there is still no agreement in the literature on the concept of IT services (Janita & Miranda, 2013). Some researchers argue that the lack of human interaction differentiates IT services from traditional services (Cox & Dale, 2001; Fassnacht & Koese, 2006). Whereas other researchers take into account all the key processes and interactions that are involved before, during, and after the delivery of IT services (Bauer et al., 2006; Parasuraman et al., 1985). This study confirms the last approach. Customers of TNNL perceive the customer portal and the implementation of a knowledge-based system as an added-value to support the service delivery. However, they emphasize on an integrated collaboration in which human interaction is required before, during, and after the service delivery. Moreover, client contact is indicated as priority number one in the interviews. In short, IT services support the service process, but cannot fully replace the service delivery to ensure good service quality.

Third, this study offers a method to analyze how a company intends to create value with their service desk for customers with the facilitation of IT. Previous studies indicated that the VPC helps to develop customer-oriented service innovation (Matsumae & Burrow, 2014). The advantage of this method is that the process starts with a blank sheet and allows customers to describe their own voice towards service quality instead of predefined questions. Additionally, the VPC offers the management a clear overview of the main pains and gains customers experience in collaboration with the service desk when performing their job. This

comprehensive overview helps the management to create value with their services for customers and contributes to a decrease in the service quality gaps. Moreover, the critical pains and gains mentioned by customers in the VPC were for a great extent related to the SERVQUAL dimensions as studied in the survey and discussed in the interviews. This provides further evidence that the SERVQUAL model is an appropriate tool for measuring service quality.

6.2 Practical implications

While organizations increasingly implement IT services to enhance service quality (Davenport & Kirby, 2015), this study shows that IT is not the answer to provide good service quality. However, IT facilitates the service process to ensure service quality. Practical implications are provided on a strategic and tactical level.

Strategic

There are several suggestions to enhance the service quality of TNNL on a strategic level. All respondents rated responsiveness as the main dimension for improvement in terms of service quality. To improve this quality gap, there are several actions to take. First, more attention should be paid to the communication skills of the service desk. According to Kaiser (2021), one of the main requirements for working at a service desk are good communication skills. Customers experienced negative emotions towards the back-channeling of the service desk, indicated a lack of individual attention, and feedback on the status of requests. To improve the service quality, a communication training can be provided for the service desk. The training might address the professional language, writing skills, back-channeling, and the information provided to customers. This way, more attention will be paid to client contact with a positive effect on responsiveness and empathy. Communication can make or break the relationship with customers (Kaiser, 2021).

Second, a difference in response time is perceived by customers for on-demand requests and service level agreements with a negative effect on service quality for customers without a service level agreement. However, responsiveness has a cost price. Customers pay more in the case of service level agreements and have priority over on-demand request. On a strategic level should be defined how to deal with customers without a service level agreement in terms of responsiveness to ensure service quality. For instance, the duration of open requests without updates for on-demand requests could be determined. Or it could be a strategic choice to choose for a low responsiveness for on-demand requests to support customers to choose for a service level agreement against a high cost-price. According to Jänti et al. (2012), frequent communication between the service provider and consumer often means a better perception of service quality. Determining and monitoring the duration of open requests and the implementation of periodic (communicative) updates would therefore increase the service quality. In addition, TNNL has a long lead time in solving requests. Keeping customers updated helps customers to understand why some requests have a long lead time.



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Furthermore, customers indicated their willingness for an integrated collaboration between the Royal Dutch Navy and TNNL. According to Rahman et al. (2014), collaboration stimulates information sharing, improves quality and timely project completion, results in a better communication, and encourages teamwork. The strategic team has to decide how to organize this integrated collaboration to enhance service quality. This could be in the form of a strategic service alliance or a forum as proposed in the workshop. According to Bierlly et al. (2007), alliances allow firms to focus on tasks they do well and rely on partners in other areas. Alliances can improve a firm's strategic flexibility as well since the firm commits fewer resources to each of the different activities (Bierlly et al., 2007). TNNL and the Royal Dutch Navy are struggling both with resource problems and a loss of knowledge. A service alliance, in which information is shared and tasks are divided, might help to overcome resource problems increasing the service quality dimension of assurance. Moreover, it creates shorter lines of communication and supports better insights into the future and vision of services.

Additionally, a gap was found between the strategic team and other stakeholders in regard to the tangibles dimension. The strategic team pointed out that the customer portal is not used in the correct way yet. According to the strategic team it is used in a person dependent way instead of a process dependent way. According to Zheng and Nieh (2004), operating systems often ignore process dependencies, which may result in a poor performance. The implementation of the customer portal in a process dependent way makes it possible to get insights into the current status of requests, the person handling the requests and the activities this person takes. This makes it easier for the service desk to fulfill requests in an appropriate manner of time with a positive effect on service quality. The internal control of this process focusing tool should be monitored on a tactical level.

Tactical

On a tactical level should be decided how to translate the strategic direction into deliverable activities. The results show that IT services make it possible to support service quality and help to fulfill customers' requirements. Therefore, the tactical layer of organization control focusses on the use of IT services to accomplish the strategic direction. According to Huang and Rust (2018), some tasks are more difficult to perform by IT and take longer to develop successful applications for. Therefore, a distinction is made on the implementation of IT on the short-, medium-, and long-term. Chapter 5 (figure 8) presented several IT tools to support the service process. The proposed services on the short term refer mainly to mechanical and thinking intelligence as defined in the theoretical framework. The main type of mechanical intelligence that can be implemented on the short-term is a knowledge based system to decrease the lack of information. Data in terms of thinking intelligence can be used to offer more personalized services to customers. On the long term, more attention should be paid to time consuming feeling intelligence applications and the extension of thinking intelligence, like a chatbot and service webshop.

The main practical implications on the short- and medium-term that follow from the results section are illustrated in figure 10. The first two columns describe the interaction between customers and the service desk of TNNL. The strengths and weaknesses of the service process are described in the analysis column including practical implications.

CustomerSubmit request via mail or Submit request in Customer PortalReceive acknowledgement	Service Desk Register request Check registration	 Analysis Customers appreciate the single of point of contact of the Service Desk. Customers feel safe to share information/submit requests. 	
Receive status update	Monitor request & communicate status	 Lack on the status of requests to customers, in particular for on-demand. Lack of information for customers. 	Communication training Knowledge-based system
		Lack of available experts/resources at TNNL.	Service alliance
Receive closure announcement	Send closure announcement and close request	 There is no feedback loop to customers when a request is closed. 	Communication training
	Request closed by the service desk		

Figure 10. Strengths, weaknesses, and practical implications of the service desk.

Furthermore, the tactical and strategic level of organizational control should think about what each department needs to accomplish to fulfill the suggestions. As mentioned before, all the key processes and interactions that are involved before, during, and after the delivery of IT services are important to consider for service quality (Bauer et al., 2006; Parasuraman et al., 1985). Therefore, willing and competent frontline workers are essential for creating a successful service outcome. However, they represent only half of the service delivery (Sierr et al., 2009). Employees share the responsibility for successful service outcomes although the mutual involvement varies (Sierr et al., 2009). For instance, when Customer Contact Center engineers behind the service desk cannot answer a request from a customer, they approach experts from product development within the organization of TNNL who have more in-depth knowledge of products. They should feel responsible for a good service quality as well and help the people behind the service desk with complex technical questions. Ter Hoeven and Verhoeven (2013) have shown a positive association between information flow and responsibility. The authors argue that sharing information results in taking responsibility. Therefore, not only an integrated collaboration with external customers is suggested in which information sharing is critical, but an internal integrated collaboration as well.

A summary of the proposed actions as presented in chapter 5 and 6 are shown in table 13 on the short-, medium- and long-term. The time frame is seen as an important aspect to deal with the competitive market. The short-term actions are generally reachable in one year, while the medium-term actions necessitate a one to five years reach. The long-term actions can take more than five years, in particular for TNNL which operates in a complex market.

Implementation	Time period	Action		
Non-IT actions to enhance service quality				
Communication	Short	Organize a communication training for the		
training		service desk.		
Updates about the	Short	Update customer about the duration of open		
duration of open		requests for on-demand and service level		
requests		agreements.		
Process dependent	Short	Make the service process more process		
operating system		dependent instead of person dependent.		
Integrated	Medium	Make sure there is a better integrated		
collaboration		collaboration between TNNL and customers.		
IT-actions to enhance service quality				
User interface of the	Short	Improve the user interface of the customer		
customer portal		portal (e.g. personalization).		
Knowledge-based	Short	Decide on the information to share through a		
system		knowledge-based system.		

Table 13. Roadmap with actions.

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Remote assistance	Short	Offering the opportunity for video remote assistance.
User groups/feedback loop	Medium	Create user groups/feedback opportunities to assess the portal and services provided.
Forum	Medium	Create a forum to discuss issues at an international level instead of individual contracts.
Service webshop	Long	Offering a self-system for service parts.
Chatbot	Long	Having a 24/7 chatbot as the single point of contact.

6.3 Limitations and recommendations for future research

The theoretical and practical implications of this study should be considered in light of some limitations. First, this study collected and analyzed both quantitative and qualitative data to investigate the service quality facilitated by IT. According to Behket and Zausznieuwski (2012), "methodological triangulation has been found to be beneficial in providing confirmation of findings, more comprehensive data, increased validity, and enhanced understanding of the studied phenomenon" (p. 2). However, the reliability of the measurement instruments for the survey are not measured by means of statistical techniques. This is not considered a major limitation, as the survey functioned as a first exploration of the perceived service quality in the internal and external environment. With regard to the qualitative part, this study used-theory driven categories based on the service quality dimensions in the literature. Moreover, inconsistencies are discussed with an independent coder. In future research, it is recommended to continue the employment of multiple research methods, but to pay attention to the reliability and validity of the measurement instruments employed as well.

Second, this study collected quantitative information from a small sample of 17 respondents. A consequence of the small sample is the lack of statistical power. In addition, the external stakeholders are limited to the Royal Dutch Navy. However, TNNL is an international company offering services to defense organizations worldwide. The inclusion of multiple countries and a bigger sample increases the impact of this study. According to Donthu and Yoo (1998), culture influences the customer's service quality expectations. Therefore, it is important to consider measuring service quality in an international context. In future research, it is recommended to pay attention to cultural differences in terms of service quality.

Third, the intervention and evaluation phase is not included in the current study. The actual implementation of actions provided in the previous section are time-consuming. Therefore, this study is limited to the first three phases of the regulative cycle: the problem statement, analysis and diagnosis, and design. Because of the limitation towards the first three phases of the regulative cycle, there are no practical implementations provided on an operational level. This level embodies actions and functions to sustain specified plans (Calimli et al., 2014).

Future research should explore how the suggestions provided can be implemented on an operational level. For instance, what a communication training should look like for Customer Contact Center engineers to enhance service quality.

Despite these limitations, this study serves as a valuable starting point for future research into the facilitation of IT for service quality in a B2B and B2B context. In particular, this study focused primarily on people's perceptions and expectations towards service quality in a hightech organization. Scholars are advised to apply it to other B2B and B2G agencies if allowable. Additionally, as the model implies the service quality perception differs from time to time, scholars are advised to employ a longitudinal research design (Buttle, 1996). Ultimately, this study increases our understanding of service quality in a B2B and B2G setting and contributes to practical implications on how to enhance service quality with the facilitation of IT.

6.4 Conclusion

This study explored the service quality of the service desk provided by TNNL and the facilitating role of IT. As shown in the quantitative results, TNNL does not deliver a poor service quality, however there is room for improvement. Whereas many industrial services implement IT services to enhance service quality, this study has shown that IT is not the only solution to improve service quality. However, it is a valuable asset to support service quality. On a short- and medium-term, the first steps in mechanical- and thinking intelligence can be made to support the service delivery. The actual implementation of feeling intelligence is a project for the long term. The main points identified in the analysis are collaboration and communication with customers to enhance service quality. To conclude, "Keep your Customer on the Radar" for improving service quality.

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APPENDIX A: SERVICE PROCESS AND RESEARCH MODELS

Figure 1. Service process of the Service Desk (SD).



Figure 2. Value Proposition Canvas (VPC).



Figure 3. IT Service Management Maturity Model (ITSM).

APPENDIX B: SURVEY, INTERVIEW GUIDE AND WORKSHOP PLANNER

B.1 Survey

Survey Service Quality: The purpose of this survey is to get an overview of the current service quality perception prior to the interview. The scope of this research is limited to the first line support of the customer contact center, where the requests are fulfilled by the engineers. It will take approximately 5 minutes to complete the survey.

To what extent do you agree with the statements below? Please answer on a scale from 1 to 5, where 1 = Strongly agree and 5 = Strongly disagree.	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Thales has suitable communication tools to submit requests.					
There are enough interaction moments in the service process between Thales and customers.					
The information required to submit a request is clear.					
Thales responds with its communication tools to IT trends in the market.					
Thales provides its services at the time promised to do so.					
There is transparency in the service process.					
Thales does what has been communicated to customers.					
Thales shows a sincere interest in solving complaints.					
Thales is never too busy to respond to service requests.					
Thales responds to service requests in an appropriate manner of time.					
Thales makes information easily obtainable for customers.					
Thales frequently communicates about updates in the service process.					
Customers feel safe in their transactions for services.					
Thales has the knowledge to answer the service requests.					
Thales commits the necessary resources for service quality.					
Thales has the necessary capabilities to meet customer requirements for service.					
Thales gives customers individual attention.					
Operating hours are convenient for providing services					
Thales understands the specific needs of customers.					
Thales is easily accessible for service requests.					

B.2 Interview guide (Dutch)

This appendix contains the interview guide for the follow-up interviews:

FASE	CONTENT	
Introductie	Introductie afstudeerder:	
	Naam, studie, leeftijd	
	 Doel van het onderzoek uitleggen 	
	Introductie respondent:	
	Werkervaring	
	Huidige functie	
Toestemming	Toestemming vragen om het interview op te nemen en	
	uitleggen dat de antwoorden niet terug te herleiden zijn.	
Start interview	 Hoe tevreden bent u met de service verlening in het algemeen? 	
	Kunt u een voorbeeld geven van een situatie waarin u	
	tevreden/ontevreden was met de service verlening?	
	Waarom? En in welk deel zit dit (proces, communicatie of afhandeling)?	
	 Als u de service verlening een cijfer mocht geven, wat zou dit dan zijn? 	
	• Hoe zouden we dit cijfer kunnen verbeteren volgens u?	
	• Als u TINNL vergelijkt met anders leveranciers, noe doen we het dan?	
	 Hoe zou IT volgens u kunnen helpen om de service kwaliteit te verbeteren? 	
Motivatie survey	Opvallende resultaten in de survey bespreken:	
	 Waarom vind u [service dimensie] dit wel/niet goed 	
	gaan?	
	 Wat kan er op dit vlak verbeterd worden? Wat zijn uw verwachtingen? 	
Afsluiting	Bedanken voor de toelichting en tijd. Mocht de respondent later	
	nog vragen hebben, kan hij/zij contact opnemen met de	
	afstudeerder.	

B.3 Workshop planner (Dutch)

This appendix contains the workshop planner for the external and internal workshop:

External:

FASE	CONTENT
Introductie	Introductie afstudeerder en deelnemers
	 Doel van het onderzoek uitleggen: service kwaliteit verbeteren in
	tijden van digitalisatie. Waar gaan we in de toekomst naar toe en
	hoe kunnen we de service kwaliteit in stand houden?
	Ondervinden wat jullie behoeftes en wensen daarin zijn. Het gaat
	hier met name om de service desk, dus de Customer Contact

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	Center Engineers, die verantwoordelijk zijn voor het managen en		
	registreren van verzoeken en een stuk technische assistentie.		
Workshop fase 1	 Poster laten zien van de Value Proposition Canvas, uitleggen dat de focus ligt op het rechter gedeelte, genaamd het customer segment. Deelnemers krijgen allemaal een pen en drie verschillende kleuren postits, waarbij elke post-it op de poster wordt geplakt. De kleuren staan voor de jobs, pains en gains. Beginnen met de customer jobs, dan naar de gains en eindigen met de pains. Elk onderdeel wordt uitgelegd en tijdens het plakken van de post-its mogen de deelnemers discussiëren. Door middel van het stellen van vragen worden de deelnemers op weg geholpen. 		
	 Vragen die helpen tijdens het formuleren van de jobs, pains en gains: Welke taken probeert de deelnemer te vervullen in zijn werk? Wat moet de deelnemer absoluut realiseren? Welke dingen kunnen de deelnemer helpen om deze belangrijke taak te vervullen? Welke problemen probeert de deelnemer op te lossen? Wanneer voelt de deelnemer zich ontevreden? Wat zijn de pijnpunten, ergernissen en wat bezorgt hem hoofdpijn? Op welke manier presteert de huidige service desk niet goed genoeg in de ogen van de deelnemer? Welke features ontbreken er? Zijn er problemen met prestaties of functioneert iets niet? Wat zijn de voornaamste problemen en uitdagingen waar de deelnemer mee te maken krijgt? Welk kwaliteitsniveau verwacht hij en waarvan ziet hij graag meer of minder? Op welke aspecten zouden de taken van de deelnemer gemakkelijker maken? Waar is de deelnemer het meest naar op zoek wanneer hij contact opneemt met de service desk? 		
Pauze	30 minuten		
Workshop fase 2	Gezamenlijk ranken van de jobs, gains en pains van "heel belangrijk" tot "niet belangrijk voor customer jobs en "extreem" tot "gemiddeld" voor gains en pains. Daarna is er de gelegenheid om toelichting te geven op de ranking.		
Afsluiting	Bedanken voor de toelichting en tijd. Mochten de deelnemers later nog vragen hebben, kunnen zij contact opnemen met de afstudeerder.		

Internal:

FASE	CONTENT
Introductie	 Geen persoonlijke introductie vereist, want de afstudeerder en deelnemers hebben al kennis gemaakt tijdens de follow-up interviews. Deelnemers worden ontvangen in het Shared Facility Center met koffie, thee en cake.
Presentatie	Presentatie door afstudeerder, waarin de methode en resultaten van het onderzoek worden getoond en de belangrijkste wensen en behoeftes van de klant ten aanzien van service kwaliteit worden besproken. Tabel 3 (p. 20) wordt geïntroduceerd om te stimuleren dat IT kan helpen om de service kwaliteit te verbeteren.
Pauze	15 minuten
Workshop fase 1	Poster laten zien van de Value Proposition Canvas, uitleggen dat de focus ligt op het linker gedeelte, genaamd de value proposition. Deelnemers krijgen allemaal een pen en drie verschillende kleuren post-its, waarbij elke post-it op de poster wordt geplakt. De kleuren staan voor de service, gain creators en pain relievers. Beginnen met de service, dan naar de gain creators en eindigen met de pain relievers. Elk onderdeel wordt uitgelegd en tijdens het plakken van de post-its mogen de deelnemers discussiëren. De value proposition wordt ingevuld op basis van de toekomst met de customer segment ernaast van de klant, zodat er wordt nagedacht over de services die aangeboden moeten worden om klanten van een goede service kwaliteit te voorzien in de toekomst met de hulp van IT.
Workshop fase 2	Gezamenlijk ranken van de voorgestelde services met de bijbehorende gain creators en pain relievers. De ranking is van "korte termijn" tot "medium termijn" tot "lange termijn". Daarna is er de gelegenheid om toelichting te geven op de ranking.
Afsluiting	Bedanken voor de toelichting en tijd. Mochten de deelnemers later nog vragen hebben, kunnen zij contact opnemen met de afstudeerder.