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Measuring Cost of Quality against Service Quality in a Telecom firm

Linking Costs with Service Quality

Helsinki Metropolia University of Applied Sciences

Master of Engineering

Business Informatics

Thesis

26.4.2019

Author(s) Title	Aleksi Viitamäki Measuring Cost of Quality against Service Quality in a Telecom firm
Number of Pages Date	59 pages + 2 appendices 26 April 2019
Degree	Master
Degree Programme	Engineering
Specialisation option	Business Informatics
Instructor(s)	James Collins, Lecturer

This thesis set out to find a solution to a business problem the case company presented: currently in wholesale commercial products there were no ways to validate how investments impacted the service quality.

During the current state analysis, we gathered data by interviewing several key stakeholders and reviewing some important company documentation such as service descriptions, customer satisfaction survey and finance. As an outcome of the current state analysis we found out that the service quality was not connected with the cost components and thus measuring investment impact was impossible. Additionally, we detected some issues in the current way of cost allocation. We also looked in to the current KPIs in both finance and service quality dimensions and quickly understood that between the units several processes and KPIs were mismatching.

In the existing knowledge we looked to the literature about cost estimation, cost allocation, Cost of Quality and Service Quality. Plenty of literature about these key areas were found and we were able to understand well what sort of actions generate costs and in the Service Quality perspective what KPIs are measuring it. Outcome of the existing knowledge was a conceptual framework that connects Cost of Quality dimensions with Service Quality KPIs.

The proposal building was done in an internal workshop with key stakeholders and based on our conceptual framework. We built a tool that addresses both estimation issues and links the Cost of Quality to the Service Quality in a manner that allows comparison between the departments too. The tool is based on conceptual framework's CoQ-SQ -matrix that contains both Cost of Quality dimensions and Service Quality KPIs. It enables linking the KPIs and reviewing only portions, or the whole matrix at once.

Lastly, we validated the tool proposal with key stakeholders of the units and gave some other validity related comments regarding our outcome.

Keywords	cost of quality, service quality, customer service, wholesale, cost estimation, telecom

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1   Business context, problem, objective and outcome

1.1   Overview

In telecom business, most of the companies offer quite similar services which brings up a differentiation dilemma. Finnish regulation has put the switching costs especially for the consumer customers extremely low and made the actual process quite easy. For example, one may transfer his or her phone number to another provider. Automated processes make sure that a new customer receives the SIM card quickly.

Long term trend for the telecoms to answer competition has been to lower prices and/or increase the bandwidth, minutes, SMS' or other key feature of a subscription. However, as Finnish telecoms truly already have lowest ARPU but highest mobile network utilization in the world (Tefficient 2017), telecoms cannot continue this track. Thus, they are on a quest to find other differentiation factors such as addons rivals do not offer, automation, roaming benefits, loyalty benefits, marketing and customer service quality.

This study aims to assess one portion of above: how investments i.e. costs in to the technical customer impact service quality. The scope of the study has been restricted to technical customer service of the commercial wholesale customers.

1.2   Case company

DNA Plc. is one of the three big telecoms in Finland with 1600 employees and net sales of 910 Million euros. (DNA 2018). DNA has its own mobile and terrestrial TV network covering 99,6% of the population, with millions of subscriptions and highest mobile data usage per subscription in the world (Tefficient 2017). DNA fibre core network is spreading throughout Finland and DNA is market leader in cable TV services with hundreds of thousands of customers. DNA also has a broad store network, offices in over dozen cities and several resellers.

DNA consist of two business units, a larger consumer segment and smaller corporate segment with about 25% of net sales. DNA's Consumer segment offers consumers diverse telecommunication services such as communication, information, safety and entertainment, including mobile phones and mobile phone subscriptions, broadband (mobile and fixed), data security services, TV services from connections to channel packages as well as fixed telephone connections. DNA's Corporate segment offers companies and communities nationwide, standardised and easy-to-use communication and data network solutions, including SMS, telecommunication and voice services, comprehensive solutions as well as services to domestic and international teleoperators (DNA 2018).

DNA Wholesale is part of the corporate business. Wholesale sells regulated and commercial services to the customers that are either direct rivals meaning other telecoms in the Finnish market, partners such as telecoms in other markets and integrators. Because wholesale customers build their own services on top of the DNA wholesale connectivity product, the products are usually very simple, e.g. fibre or copper wire from street cabinet to the end-customer. Wholesale often calls their products as "raw material" as it is pretty much leasing network to another telecom. Still, volumes are high, and customers are also professionals on the technological aspects which puts high demands on the service quality.

1.3   Business challenge

The case company's wholesale business does not currently have tools or measures to understand the most profitable level of technical customer service quality. In other words, case company needs a way to connect the technical customer service cost components with service quality KPIs so those can be used to see how investing impacts quality. As in many cases, also in this knowledge is important as one can easily over- or underinvest for example technical customer service which ultimately leads to excess costs or on the other hand poor customer experience, brand damage and contract terminations.

1.4 Objective, scope and the thesis outcome

The objective of this study is to build a tool with KPIs that measure the technical customer service quality against investment. Outcome of the thesis is a tool with KPIs that measure the technical customer service quality against investment.

Scope of the study is limited to the wholesale business and focus is in the technical customer service factors and customer experience/satisfaction aspects of commercial products. Regulated (non-commercial) products are not within scope, although mentioned several times. The data of regulated products is gathered in a different manner and from different ticket template because it is mandatory to provide the data correctly.

It is clear, that unstable services do not sell well, so the service stability aspects, or technical quality, is inspected and assessed less.

1.5 Key terms and concepts

ACSI = American Customer Satisfaction Index
AI = Artificial Intelligence
ARPU = Average Revenue Per Unit
CAPEX = Capital Expenditure
COQ = Cost of Quality
COPQ = Cost of Poor Quality
CSA = Current State Analysis
CX = Customer Experience
EBITDA = Earnings Before Interest, Taxes, Depreciation and Amortization
EPSI = Extended Performance Satisfaction Index
FCH = First Call Handling
FCR = First Call Resolution
FPS = First Pass Resolution
HR = Human Resources
IT = Information Technology
ITIL® = Information Technology Infrastructure Library
ITSM = Information Technology Service Management
IVR = Interactive Voice Response
KPI = Key Performance Indicator

NNI = Network-to-Network Interconnect

r/tNPS = (relational/transactional) Net Promoter Score

OCC = Operator Contact Centre

OLA = Operational-Level Agreement

OPEX = Operating Expense

ROI = Return On Investment

SAFe = Scaled Agile Framework

SD = Service Desk

SLA = Service Level Agreement

SMS = Short Message Service

SQ = Service Quality

tCES = Transactional Customer Effort Score

TQM = Total Quality Management

VCMS = Value-based Cost Management System

1.6 Thesis outline

The research is conducted in both quantitative and qualitative method, though we are focusing mainly on qualitative aspects. Conclusions are composed from material provided by the case company, such as customer satisfaction surveys, key point indicators, interviews of internal and external stakeholders and existing literature around the topic.

Literature has been obtained from several sources such as internet websites, Proquest and EBSCO. More about literature can be read in chapter 4.

The thesis is organized as follows: First we have an introduction to the case company and key starting point of the thesis: challenge, objective and outcome. Then in the second chapter we explain the actual research design. In the third chapter the ongoing Case Company situation is explained in the form of Current State Analysis (CSA). After concluding the weaknesses found in the CSA, fourth chapter looks in to the findings and mirrors these against existing literature. Literature review produces an outcome, the foundation to our solution, which is presented at the end of chapter four as a conceptual framework (CF). Fifth chapter focuses on building the two preliminary proposals with the key stakeholders of the case company, in sixth chapter we validate those proposals with the senior level of the case company and finalize the proposals. Lastly, in the seventh chapter we have an overlook, discussion and conclusions of the study.

2　Research Design

2.1　Research Approach

The research is conducted as an applied research project. The method was chosen because it is good for solving specific challenges or problems. The applied research method is aiming to produce a usable, managerially practical result that can directly solve a problem and additionally provide new knowledge that is limited to the problem.

The applied research is significantly different from traditional basic research that is usually undertaken in the universities by people in the universities. Applied research is often set in various organizations and conducted by for example an insider researcher. Rather than trying to produce universal principles or generally significant findings, the applied research goal can be practical implication for e.g. one organization. We discuss in chapter seven of both these approaches: How well the outcome can be implemented in practice and on the other hand whether the outcome can be generalized.

Mostly the research process and focus on qualitative data collected from stakeholders and selected existing knowledge, like literature.

2.2　Research Design

This research follows Cooper's stage-gate model to keep it strictly in project mode. Originally Cooper built the stage-gate model for product development to enable better quality control. Usually the amount of stages and gates are from four to seven (Cooper 1990). In this study each of the seven gates is a barrier between study stages that tests if moving on to the next section is possible. Especially we wanted to leave an evidence trail that was tested by each gate.
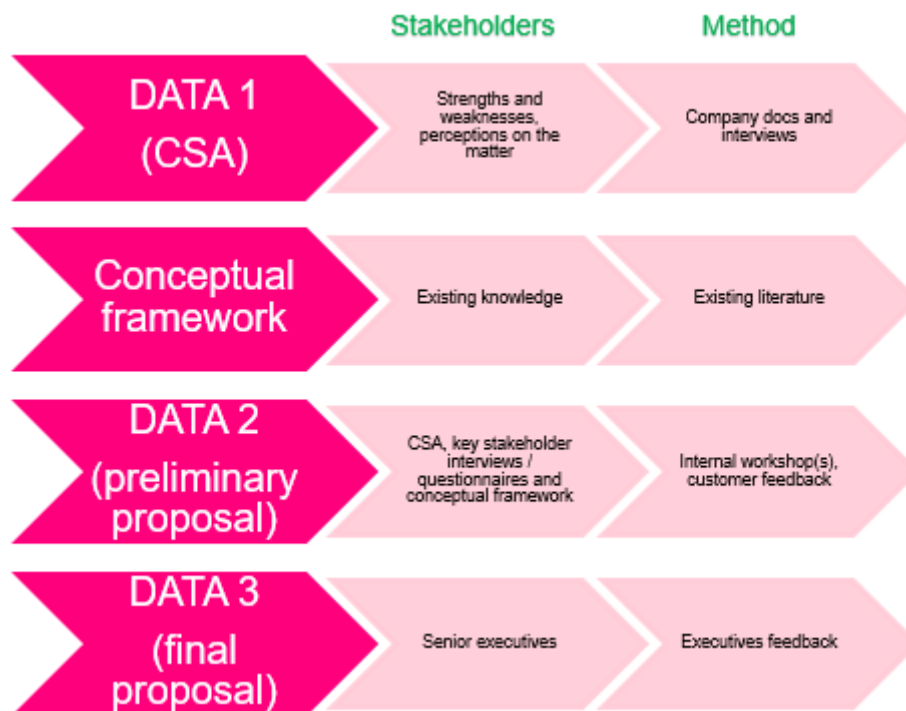
Figure 1. Research Design.

First, in chapter 3, research investigates the case company's current state about service quality and investments in it. Current State Analysis (CSA) includes interviewing key stakeholders and reviewing case company documentation, especially the financial figures and value creation in technical customer service. CSA produces an understanding of the current ways of measuring costs in the case company. CSA also addresses customer satisfaction levels. In order to do this, CSA utilizes case company's customer satisfaction survey results. Lastly, CSA brings strengths and weaknesses of the current process on the table, so the research can then make the best use of strengths and fix, replace or remove the weaknesses.

In chapter 4, existing knowledge, we review and present the existing knowledge about CSA weaknesses. Such topics include the concept and measuring cost of quality (COQ) and measurement of service quality (SQ). Outcome of the chapter 4 is conceptual framework that we build our proposal on.

Chapter 5 is the preliminary proposal where we build our tool together with few key stakeholders from the company. As a foundation we use the CSA findings and conceptual framework. We also found an interesting dilemma regarding cost estimation during the CSA, which we will address in an addition to the actual tool proposal.

Chapter 6 is for validating the proposal. We present our proposal to the senior level stakeholders and gather their feedback.

Chapter 7 has discussion about how the research project succeeded considering the problem, objective and outcome in chapter 1. We also see if and how the results can be generalised or if the results are transferable.

2.3 Data Collection and Analysis

Our data plan is displayed in figure 2.
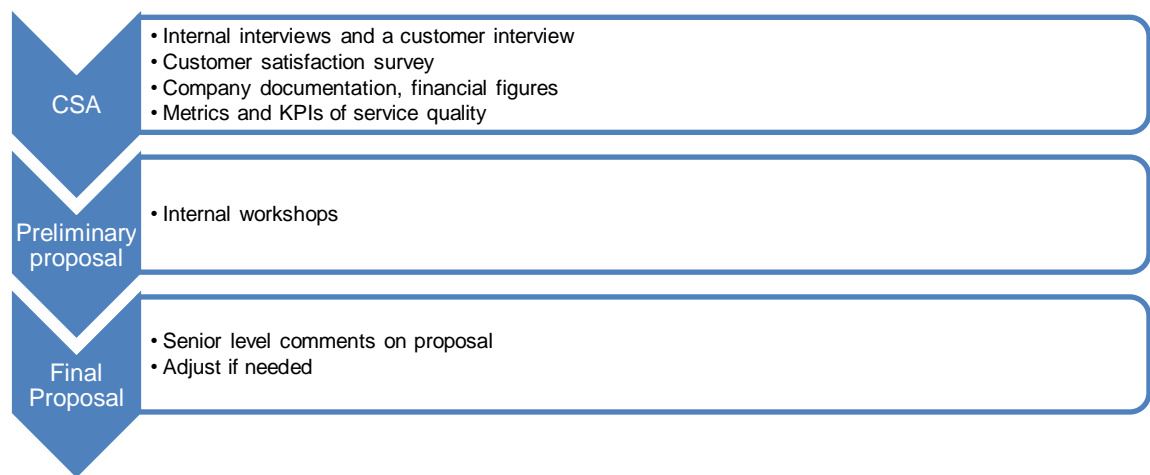
Figure 2. Data Plan.

In this research we focus on qualitative data, though to put things in perspective it was necessary to collect some quantitative data as well. Data in this research was collected mainly from internal assets like documentation (processes, finance, product descriptions etc.) and from internal workshops with key stakeholders. In the CSA we also interviewed a major customer but mainly the research focused on collecting information from within the case company.

The Current State Analysis focused on gathering the data from 6 sources: Company documentation, internal interviews, customer satisfaction survey 2017, a customer interview, metrics of finance and metrics of technical customer service. The CSA data collection and analysis is explained in more detail in chapter 3.1.

Conceptual Framework was built around the themes that arise from CSA. The existing literature was collected from trustworthy, acknowledged scientific sources like EBSCO, ProQuest, Dawnsonera, Science Direct and Theseus. All external sources are mentioned in the references.

Preliminary proposal merged the data from CSA and knowledge of CF together. As we discussed earlier, comments were gathered from an internal workshop. Previously during CSA, internal stakeholders and interviewed customer also mentioned some of their visions when collecting data for CSA. That data was stored to be used in preliminary proposal.

For final proposal data was collected only from senior executives of the case company. They were presented with the proposed tool for measurement and additional ideas.

2.4   Validity, Reliability and Credibility

2.4.1   Validity

The study is based on gate model, which provided us a straightforward way to conduct the study. Study has been conducted by an internal researcher who has plenty of additional knowledge on the themes around the study. Data has been gathered from the systems but limited to the scope of the study. Also, as the study is only scoped to one single entity, generalising is complex, although some parts of the study can be used in a broader, e.g. Telecom industry, cases. We also remind that such one-round action research as this, we do not aim for transferability. Lots of out-of-scope matters have been left aside for the sake of clarity, some also mentioned in chapters 5 and 6.

2.4.2   Reliability and Dependability

The study has been conducted between years 2018 and 2019, where lots of changes have been implemented to the processes and workflows. If this study would be conducted again, it is unlikely that the same result would be achieved. The study is joining both quantitative and qualitative methods, and industry is constantly swiftly evolving. Internal researcher also can make different conclusions than another, perhaps external

researcher would. Some of the findings in this study have been already mitigated during the study.

In dependability context the study should not be replicable. Our logic, however, can be quite easily. Findings of this study are based on available theories like Cost of Quality or SERVQUAL. Thus, the same logic can be applied in another study.

2.4.3 Credibility

Because the study uses a great deal of qualitative analysis, the credibility requires a few words. We use multi-methods: both quantitative and qualitative, although qualitative methods are more applied. Data has been collected from several sources including IT systems, customer satisfaction surveys, interviews and documentation. In overall we had over dozen interviews and three workshops.

In theoretical credibility the study is combining several sources and theories in to chapter 4 (existing knowledge). We have looked in to several cost aspects and theories and even more to the service quality theories like SERVQUAL, EPSI, ACSI, NPS, etc.

There has been only a single researcher in this study. Due to academic way of producing text, I refer to myself as "we".

3 Current State Analysis

3.1 Introduction

Current State Analysis or CSA included 9 one-hour interviews with key Directors, Business Controllers and Department Heads of the case company. These were such as Vice President of Wholesale, Directors of the two production units, and several Department Heads within the units. We also interviewed Business Controllers of Wholesale and Service Desk. Separately, in an email, we requested comments on quality and finance related matters from a fourth Director level stakeholder. Later, as we learned more, we

utilized snowball technique and did three more interviews, such as one with a key account customer to clarify and verify certain quality related assumptions, and with Wholesale Business Controller regarding Case Company finance understanding.

A specific set of questions was asked from each stakeholder and some questions were only directed to certain stakeholders with respects to their roles. The customer also got another targeted question set that was focusing on earlier findings. Two interviews were conducted in English, others in Finnish. Most interviews were taped for later analysis and we took notes of each interview.

Before the writeup the data has been processed mainly on paper including tools like mind-mapping and traditional strengths, weaknesses, opportunities and threats (SWOT) analysis. During the processing, the notes were read and analysed multiple times, and the recordings were listened to fully understand all answers. If any new relevant information was located, it was recorded to the notes as well.

This research has several of the case company's service functions within the scope: Service Desk (SD) and Operator Contact Centre (OCC) with their respected 2nd levels.

3.1.1 Interviews

The question set was split to two different categories: financial and quality. Financial question set was:

- What are the key functions producing customer service? (Mitkä ovat keskeiset funktiot asiakaspalvelun tuottamisessa?)
- How do we measure cost of customer service? (Kuinka mittaamme asiakaspalvelun hintaa?)
- Do you think we currently invest too much, just the right amount or too little in to the customer service? (Koetko, että investoimme liikaa, sopivasti tai liian vähän asiakaspalveluun?)
- How do you know that? What methods, what KPIs? What tools? Are they any good? (Kuinka me tiedämme tämän? Mitä metodeita tai KPI:tä käytetään? Entä työkalut? Ovatko ne toimivia?)
- Optional: What is the current cost of service? (Mikä on tällä hetkellä asiakaspalvelun hinta?)

- Do we ever get any surprising costs? What? (Syntyykö meille koskaan yllättäviä kuluja? Mitä?)
- What tradeoffs we have had to make in the past? (Mitä säästöpäätöksiä olemme joutuneet tekemään?)
- Why these were selected? (Miksi juuri nämä?)

Quality question set was:

- How do we measure customer service quality? (Kuinka mittaamme asiakaspalvelun laatua?)
- Why have we selected these figures? (Miksi juuri nämä on valittu?)
- Who decides on these? (Kuka päättää näistä?)
- How are decisions communicated? (Miten päätöksistä viestitään?)
- Currently, which (three) key aspects/methods are the most value adding elements of our customer service? Why? (Nimeä (kolme) asiaa/toimintatapaa, jotka nykyhetkessä lisäävät eniten arvoa asiakaspalvelussamme? Miksi?) This question could be also "What are our current advantages?"
- Currently, what three aspects/methods are least value adding? Why and can we tradeoff those? (Nimeä kolme asiaa/toimintatapaa, jotka nykyhetkessä ovat vähiten arvoa lisääviä? Miksi ja voidaanko niistä luopua?)
- What is our current position in terms of customer service quality in the industry? (Mikä on meidän tämänhetkinen sijainti asiakaspalvelun laadussa toimialalla?)
- On what do you base your answer? (Mihin perustat vastauksesi?)
- Optional: What is the fastest way of increasing customer service quality? (Mikä on nopein tapa nostaa asiakaspalvelun laatua?)
- Optional: What is the cheapest way of increasing customer service quality? (Mikä on halving tapa nostaa asiakaspalvelun laatua?)
- Optional: What is the best way of increasing customer service quality? (Mikä on paras tapa nostaa asiakaspalvelun laatua?)
- Evaluate our level of automation and its capabilities in added value and customer satisfaction? (Arvioi meidän nykyistä automaation tasoa ja sen kykyjä lisäarvossa sekä asiakastyytyväisyydessä?)

The question sets were formulated in a way that they would provide most of the relevant information in terms of KPIs and measuring them. In order to stay in subject, the sets were split in to two themes to clearly separate the financial matters. For many who are

not involved in the funding it is easy to skip the financial subjects and move to more familiar topics. Financial questions aimed to find out how the functions and systems are funded, how the cost is being measured and how interviewees felt about the current investments. Quality question set focused on very basics of customer service production: What KPIs are being used, are they any good and what are the best (or worst) practices that the case company has.

We also asked about decision making. Who decides on KPIs, who decides on operational changes, who runs the daily activities, who runs the money? If a new process is to be implemented, who decides and who implements that? Is there a clear chain of command or not? Service quality can be heavily impacted in both positive and negative way depending on how management is taken care of. Case company strategy has the customer in the very centre. Vision and mission both state that the case company has and wants to retain the most satisfied customers.

To formulate an understanding of the current state, we used tools like SW-analysis and mind-mapping. Taped interviews were revisited to do fact checking and populate additional understanding on the current state that was not taken as a note during the interview. CSA was set to find out how the case company is currently doing the technical customer service ROI measurement.

3.1.2   Company documentation

Besides the interviews, current state analysis was also done using ready material. The Business Controllers were asked to introduce how case company runs the internal budgets and cash flows. Customers can buy Service Level, what we later refer as Corporate Business SLA, to their subscriptions. The Corporate Business SLA is a separate product with its own product description that sets baseline for certain KPIs around the subscription service quality. Therefore, Corporate Business SLA product description was inspected. Case company also produces several figures and charts based on chosen KPIs. In this study we looked into all the KPIs that the technical customer service functions use.

In terms of current state analysis one of the most important documents available was the actual wholesale customer statements about the case company and its functions. The case company conducts a wide scope customer satisfaction survey on each half and it

is an important piece of data available internally. The survey is a phone call or a questionnaire that is done to several customer stakeholders. In wholesale as the number of customers is not high, nor is the amount of answers in customer satisfaction surveys. This, however, does not make survey any less important as it is the feedback from customers.

3.2   Functions

Several functions interact with the customers every day and wholesale customers have the most channels in all customer segments. These are:

- Service Desk (technical)
- Operator Contact Centre (technical)
- Service Manager if assigned
- Assigned Point of Contact in 2nd level
- Customer care (non-technical)
- Sales Manager (non-technical)
- Self-services

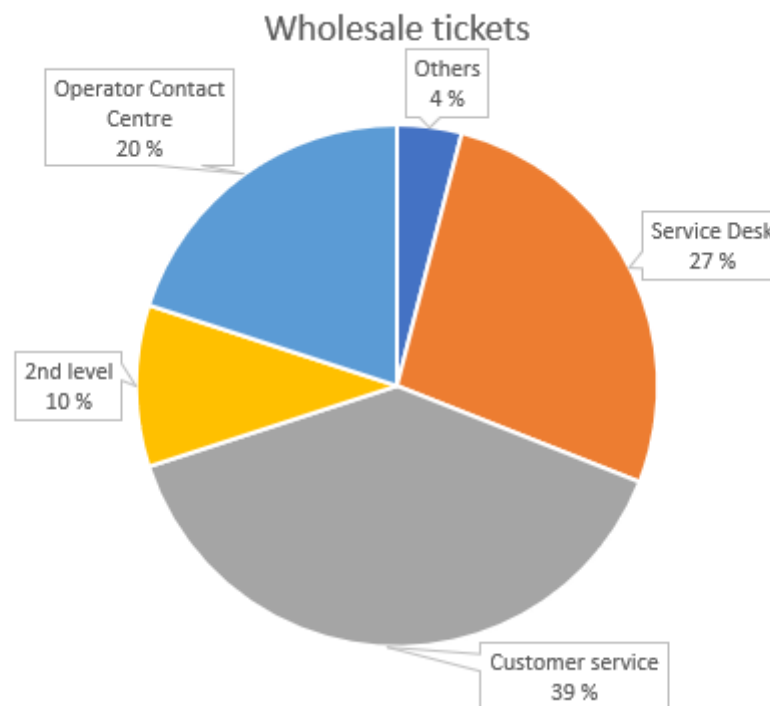In both retail and wholesale, the number of channels generally is 2 and 3 respectively.

Figure 3. All Wholesale tickets and their distribution across functions.

3.2.1   Service Desk

From technical customer service perspective Service Desk or SD is one of two most important channels for wholesale customers. It is placed in the Service Desk unit and they work 24/7, which generates by default some fixed costs due to availability requirements: They act as a first level point of contact towards the customer. Service Desk support model is based on ITIL®v3 toolkit and it uses ITIL processes which makes it easier to explain and standardize with customers. ITIL itself will not be covered in this study.

Key processes of Service Desk are close to the customer. They provide technical support over phone, self-service and email, they individually solve cases (tickets), they take care of service monitoring with proactive measures in case of event and they process maintenance advance notifications of their customers. Currently, in whole corporate business including retail and wholesale, Service Desk handles most of the tickets. Running a query to the ticketing system data reveals that wholesale customers generate roughly 5% of total tickets to Service Desk in each month. Wholesale customers are industry professionals themselves, speak the same technical language, are stricter with the processes and follow up their tickets frequently. This demand creates pressure for Service Desk to resolve these tickets quickly and keep systematic communication ongoing.

If Service Desk is unable to resolve the ticket, it can be assigned to 2nd level support. They do not have direct inbound contact channel of their own but are in touch with customers either over email or over phone. Service Desk might need to escalate the ticket because they lack knowledge in for example customer specific solutions, the ticket has been escalated by customer, the ticket corporate business SLA is about to breach or simply because every now and then Service Desk is congested and needs to offload tickets further. Of tickets that Service Desk handles, in wholesale about 25% of cases are escalated to 2nd level. According to the Department Heads, this is both implemented practice to enhance customer experience and provide highest quality professional support and on the other hand proof of complexity and demand of the tickets. Over all corporate business segments and customer tickets only 4% are escalated to 2nd level.

Majority of costs are coming from salaries. The other costs are usually training and certification costs. Case company generates many fixed costs, like HR, IT, management etc. that are not included in production unit's budget. Certifications are one key element

in producing professional technical support but only Service Desk unit has those costs specifically. Some vendors also require certain amount of their certifications to acquire specific partnership levels and reduced purchase costs.

3.2.2 Operator Contact Centre

Operator Contact Centre or OCC is a first level customer service within OCC unit. They take care of some wholesale commercial products that are operated by OCC unit. These are for example IP-transit or transmission products such as dark fibre or wavelength. In such cases OCC will dispatch the ticket to appropriate 2nd level team, who design, build and operate Case Company's core and access network. In terms of this study, especially this 2nd level team is a key asset even though only about 3% of all wholesale tickets are handled by them.

Unlike Service Desk unit, OCC unit is shared resource between consumer business and corporate business. However, like Service Desk, OCC work 24/7 and is available for direct customer contacts over phone, self-service and email. OCC's main task is to monitor case company's several internal systems and for example the core network. In case of event or alarm they will notify the 2nd level team responsible to start evaluating and solving the issue - often affecting multiple customers. OCC also has mandatory responsibilities in supporting the law enforcement whenever needed.

Other responsibilities of Operator Contact Centre include providing incident management channel for all regulated market products such as leased line, NNIs or Metro Ethernet. Regulated products often differ significantly from commercial products and those can be purchased only in Finland by another telecom for reselling purposes. All regulated products are sold from Wholesale and in terms of volumes regulated products form biggest install base of all fixed (not mobile) services. Regulated products or their customer service is not within the scope of this study.

All teams interact with each other when necessary. The reasons can be various, but in these cases cross-unit co-operation is required. It is possible that an alarm that OCC unit has noticed requires attention from Service Desk unit. Internal processes between units differ quite much which every now and then raises discussion. While Service Desk unit and its departments rely on ITIL toolkit processes, OCC unit's departments run many of

their internal specification-based processes. Neither way of working can be claimed directly incorrect, but the overlaps and mismatches could be addressed. From customer perspective the major differences are in who finally resolves the ticket, how Corporate Business SLA is treated, in the communication processes and in the escalation procedures. Bearing in mind that OCC unit receive most of the incident tickets from Consumer Business, OCC unit uses internal SLAs in parallel. Rather than measuring tickets solely based on Corporate Business SLA like Service Desk, they measure performance based on incident urgency classes. The urgency is determined by OCC with the customer.

Like Service Desk unit, OCC unit is allocating costs to Sales. According to the Director, OCC unit's Department Heads have strong role in the budgeting. In similar manner they allocate a portion of costs based on estimates that are supported by ticketing and phone calls, but the way of allocating costs differs from Service Desk. First, with the commercial products, OCC unit has its own way of splitting the costs to e.g. fixed services, mobile services and data centre services, not directly to product group level. Secondly, salaries are not the only costs. OCC unit administers several network management systems that they need to fund from Businesses (part of OPEX). Thirdly, some departments are responsible of network investments (CAPEX) that need to be included as they design and conduct the network construction. CAPEX is not within scope of this study, although explained a bit. Lastly, a key difference worth mentioning is that Operator Contact Centre is not a cost centre of its own like Service Desk. All OCC unit's salaries are in unified cost centre which masks department level salary costs. According to the Department Head and Business Controller the original reasoning for this might have been to avoid too small cost centres. Anyways, the reason is historical.

3.3 Key Performance Indicators

3.3.1 Financial KPIs

Depending on company, there are several key figures to measure profitability. Case company primarily focuses on three financial profitability KPIs:

- **Operating profit or EBITDA** which is calculated by deducting traffic, sales and other fixed costs from revenue. Also, EBITDA-% is used (operating profit per revenue).
- **Business result or EBIT** which deducts also depreciations and amortization. EBIT-% is also used.

- **Net profit** which is also called the bottom line of the financial statements and takes in account also financing costs and taxes.

In telecom business where the yearly investments, CAPEX, especially to network construction, are significant and depreciations can take even 30 years, EBITDA is one of the most important financial figures.

A major financial KPI for both Service Desk and OCC is plain salaries. According to a Department Head, due to additional costs such as insurance of an employee, actual costs are higher than the plain salary. Depending on employee there can be also additional costs from outsourcing, travelling, certification training and events. The budget and actuals are compared each month. Incoherencies are inspected and addressed accordingly.

As mentioned earlier, in telecom business another major cost centre is the network construction which is pure CAPEX. Although it has high importance in the budget and result, in this study we do not focus in the network investments but rather focus on the operating expenses (OPEX) that cover normal daily running costs. Outside regulated products OPEX is allocated to the Sales based on estimates that Department Heads create each half. The estimates are done for each team separately. Department Heads may use system tools and KPIs to support the estimates such as amount of tickets and phone calls and duration of time spent.

The Business Controllers are involved in the cost handling. They have internal discussion with each other when allocating the costs and make sure that the figures are compared to the previous year and raise proactively subjects that need deeper understanding. As soon as the allocations are done, Sales will receive product group based cost allocations that will be deducted from the gross profit to end up with EBITDA.

3.3.2   Service quality KPIs

Service quality KPIs can be roughly split in to unit KPIs and customer satisfaction survey KPIs. On corporate level only one customer satisfaction KPI exists, and it is the NPS. It is also tied to everyone's bonuses. In wholesale the relationship (r)NPS has been high, well over 25. The target has been set high as well.

Wholesale customer satisfaction survey is a wide spread survey that covers the full customer experience including sales, orders, deliveries, fault management and products. 2017 survey's fault management section covered following topics:

- Fault recurrence
- Customer effort (tCES)
- First Pass Solution
- Staff skills
- Status updating
- Advance notifications
- Trust creation
- Comparison to rivals

Service Desk have internal KPIs that are set based on experience of what sort of KPIs customers want to see, which best reflect quality service, and which are measurable. In 2018 these are:

- Phone call answer %
- Ticket time to solving
- Percentage of SD resolved tickets
- First Pass Solution
- Amount of tickets
- Response time
- Tickets resolved within SLA %

Response time and resolution time (which leads to the ticket resolved within SLA %) are also KPIs in the Corporate Business SLA which can be purchased separately. To push teams towards the goals, the KPIs are also bind to the bonuses. Service Desk unit has quarterly bonuses which differs from case company's common yearly bonuses. The difference in the bonus system is in place to be able to react quicker in changing environment. Instead of waiting a whole year, if needed, KPIs and targets can be modified or even replaced in next quarter.

As the KPIs like phone call answer percentage reflects, it is important to have sufficient amount of personnel in line. Although Service Desk does not use phone call data to allocate costs, they use the data in 24/7 resource planning. For any customer it is important to be able to reach support over phone whenever needed.

OCC unit measures their own fault management process and runs a great number of KPIs along. This means for example measuring amount of phone calls and tickets and handling times in terms of internal SLA. In 2018 Wholesale related KPIs of the Operator Contact Centre are the repair times of:

- Broadband services
- Radio network services
- Co-location services
- Speech services
- Mobile data services
- Transmission services

In overall, OCC has 18 KPIs just for fault management of which most are interesting to OCC as they usually are the starting point.

As explained earlier, OCC has its own internal SLAs to support Consumer and Corporate businesses. The KPIs are measured based on the priority classes that are automatically picked based on pre-determined service criticality and on the other hand issue urgency. A Corporate Business SLA can act as an encouragement to set the case more urgent, but it is not directly bind to certain criticality. Corporate Business SLA overrides OCC's internal SLA in current setup.

3.4 Strengths and Weaknesses of Current Process

The case company has several functions to produce customer service which act as a first or second level support. All the employees are expected to keep customer in mind no matter what one's role in the organization is. Most of the employees have a role that requires interaction with either internal or external customers. Although this study focuses on external customers, it must be mentioned that good internal customer service is significant as well.

3.4.1 Strengths

When looking in to case company's quality factors, it has some excellent strengths to display. In fact, the matter is so important that it is driven by the owners. Company strategy has customer in the very centre and the company vision is "the most satisfied and

loyal customers". Especially in 2015 company invested a great deal in explaining the new strategy, mission and vision to all employees.

Primarily, there are multiple, customer centric, SLA-based and strategy driven quality KPIs that are monitored on regular basis. Customer satisfaction survey is done over phone or email to several Wholesale customers every 6 months and it covers the customer processes from quoting to the operations. It also enables Case Company's comparison to its rivals on quite good level. Although customer satisfaction survey shows that customers see case company worse in incident management compared to the rivals, in overall customers are very satisfied and an important KPI, rNPS, is well above 25. This is excellent in terms of amount of answers.

Service Desk has implemented ITIL practices years ago and it keeps processes standardized among all customers. ITIL also helps to standardize communications in customer centric approach. Service Desk uses KPIs that are understandable and measurable to both customers and employees. Work offloading between Service Desk and 2nd level is functioning without any mentionable issues. Service Desk unit 2nd level applies same KPIs as Service Desk. Work targets are managed by the same KPIs that are bind to the flexible quarterly bonuses and none of the interviewed Department Heads or Directors disliked the current KPIs. Interviewed Customer claimed that the case company is complying with the agreed KPIs and that they are quite satisfied. According to the Customer it is not common that industry companies comply well in this sector.

OCC unit's measuring is based on KPIs that focus on end-to-end performance. In similar manner, several of these KPIs are also tied to the yearly bonuses. KPIs and achieved results are always available in the company intranet for audit.

Secondly, the case company has recently implemented SAFe development which has boosted complex systems development with the techniques of Lean. This is already bringing visible changes to some customers and adding value to the customer. Internal systems are improved to assist customer services in their everyday work. Especially OCC unit is focusing on automated systems that are built for the processes instead of processes built based on systems. Robotics development has begun and for example deliveries are already using many robots to speed up their manual tasks. Self-Services are developed to answer the need from customer segments and to address the requirement of hiring more staff instead of automation or self-servicing.

Thirdly, the case company has highly skilled experts working with the customers. Service Desk is, as ITIL suggests, constantly training new certifications to its employees and the goal is and has been for several years that Service Desk resolves majority of tickets. Service Desk is also investing in training towards improved customer service such as how to handle phone calls, how to be customer centric over email and so on.

Service Desk unit's and OCC unit's 2nd level teams consist of experts that have been working with networks for decades, some even so long time that they have been bringing Internet to Finland in the 80s. Operator Contact Centre is training personnel to recognize more products and processes. After the interviews it was also quite clear that the Department Heads are very skilled and motivated experts in their respective managed areas. Yet they have their own opinions, it seems that they are also humble and very open to new ideas. A clear evidence of any change resistance could not be seen, rather quite opposite as the interviews triggered many ideas and conversations already during the research process.

Last quality strength is certainly not the least. Although CAPEX is not scoped, this service quality aspect cannot be neglected. Within several years' time the case company has been investing heavily in to building redundant network and solutions around it. Core network is backed up with resilient routes and core services are provided from multiple locations. As a proof, the case company has not had severe network incidents in many years while both primary rivals have had several making in to headlines also. Based on ticket data, the network availability is over 99,99 %. Network capacity has been increased to accommodate today's needs and one clear advantage is the separate technology strategy that for example standardizes core and access network elements. In practice this means switching legacy components to new, standard equipment which leads to less personnel training requirements and enables automation implementation. Some good news for customers are also the new features that new technology brings.

On the financial side the costs are aligned with expectations. None of the interviewed Directors thought that the case company is exceeding the budget or that the budget has been badly designed. Some Department Heads hoped that they could get more budget for resourcing, which is quite normal in any company. Biggest costs are the salaries and focus is on improving the tools and processes, for example via techniques of Lean, instead of recruiting more.

Finance has vast amounts of data to use. Each unit, including Wholesale, has its own Business Controller whose responsibility is to make sure that budget and estimates are well done, followed up and updated so costs do not exceed the budget. Business Controllers felt that they have a good relationship with each other and means to assess any situations that may arise. For example, Controllers follow trends and if there is a change it can be discussed with each other. In some cases, Controllers do also notify each other if they see a sudden change in the estimates. Key financial figures are reviewed each month with corresponding Department Heads.

In big picture, the case company finance has been arranged in a clear manner. Costs and incomes are summarized in accounting. The process removes any requirements for internal invoices. Interviewees did not indicate any notable problems with the earnings split between Retail and Wholesale businesses, so we assume that those are correct. Although, invoicing uses different segmenting base than the ticketing system. At the end costs are allocated on product group level, so each product group profitability can be measured. Nobody mentioned that the financial KPIs would need adjusting even when persuaded.

Current finance systems allow Company to follow profitability on several levels such as customer level, product group level or e.g. unit level.

3.4.2   Weaknesses

Although the case company has received some rewards for outstanding achievements in the past, such as EPSI ratings 2010, 2011, 2012, 2013 (DNA 2018) and EPSI broadband 2015 (EPSI rating 2015), no customer satisfaction or service quality related prizes have been received since then. The interviewed wholesale customer could not mention any notable perfections either which would clearly stick out as a competitive advantage. Company has been growing from several acquisitions and broader segments have been targeted such as commercial wholesale customers in 2014. Bigger organization, even with help of strategic values "fast, brave and flexible", is slower and changes take time.

In the review of the company documentation it came obvious that some key processes have been left untouched, many important reviews undone, and these processes are run mainly according to the old design. The mismatching processes are most visible between

OCC unit and Service Desk unit who have in many ways different history with the customer service work. When for example Service Desk was implemented to Case Company's technical business customer service in 2013, Operator Contact Centre served mainly only internal customers and customers who bought only regulated bulk products. After commercial wholesale business begun in 2014, no significant changes were made to the processes. Yet, OCC unit was assigned with new Corporate Business SLAs that did not exist before. OCC continued measuring the performance and quality according to their own internal SLAs that are mapped to the previous variation of Corporate Business SLA and do not correlate with the current Corporate Business SLA levels. OCC seems to have dozens of quality KPIs which can be hard to monitor. A key question is why there are so many channels for the customers in the first place?

Decision-making was one of the themes in the interviews. Mainly this seems well arranged and coordinated. When asking how decisions are made, the answers varied depending on the person. Some felt that they usually need to confirm many decisions from upper level, while some said that they have much leverage. Answers can be explained by human behaviour and differences in leadership culture but interestingly many felt that the whole process still could be improved. This makes us wonder whether the decisions would be faster and easier to make on lower levels if decision-power would be clearer.

One key issue in financing seems to be the estimates. As the cost allocations are based on estimates, we found several somewhat debatable allocations. Service Desk unit allocate unit level costs with fixed 10% to the Wholesale and 90% to the Retail. However, again outside regulated products, data from ticketing indicates that the split should be closer to 5%. Although, we must keep in mind that some customers have purchased 24/7 service and certain minimum personnel must be present always. Risk, anyways, is that in the eyes of Wholesale, for example Service Desk can seem more expensive than it really is, which then again lowers a wholesale product group's EBITDA-%. In study context it makes it harder to propose a way to measure technical support cost if the current figures are based on assumptions, not real data. The complex way of generating the allocations in the first place is also an issue as validation gets more complex.

During interviews we made a note that skill and motivation levels regarding financing vary between the Department Heads. Some could clearly explain how their budget or cost allocations are done, while others recommended us to ask from either the Director

or the unit Business Controller. A Business Controller also pointed out that sometimes the estimates must be asked several times indicating a motivation issue.

Comparison between different departments, functions, is possible only within Service Desk unit. As OCC unit bundles the salaries into one cost centre, the department level gets incognito. Bearing in mind that the figures are not actually comparable, in 2017 SD allocated roughly 41% of the total costs while OCC allocated the rest 59%. Yet, the 59% consists of so much more additional roles and tasks, although certainly required ones, that makes it impossible to say which function is cheaper. The cost centres simply measure different scopes.

As mentioned in the beginning, the actual business problem exists. Costs are allocated to the Sales units without any validation which makes it hard for them to know whether the figures are realistic or not. Return on Invest (ROI) in this context cannot be measured feasibly. This leads to the issue that a Sales unit cannot claim that some function is expensive or inexpensive and push them to either invest less or more. Finance has overwhelming amount of data at their disposal, but it is not tied to the customer satisfaction survey or the service quality KPIs. Mismatching service quality KPIs between OCC and Service Desk cause misunderstandings and mixed expectations in the Sales.

Lastly, as the study aims to investigate how technical customer service impacts the revenue, we needed to understand not only how money is spent but also how customer support can generate revenue. This could be one step in decreasing the costs while maintaining high level of service. Interviewees claimed that there are few ways to generate money in the support. As proposed by VP of Wholesale, one way is to create leads towards sales from technical support. Not only it would be creating revenue but with technical expertise highly likely selling customer the solution that they truly need. Another way is to invoice unnecessary work from the customers which should lead to less tickets received. Third option is to sell professional services that the Case Company already has price list on. Naturally, the list of options goes on and on. Review to the finance and interviews both indicated that none of the customer support teams actually did these in well formulated manner. Ticket data indicates that for example much unnecessary work could be invoiced. However, only a fraction was invoiced and mainly Case Company offered pro bono for example unnecessary field service visits, that are direct external cost. Even in obvious cases Service Manager often had to step in and make sure that

the invoicing was done. Same applied with the professional work cases. A small, billable configuration change of the service was done but not invoiced.

3.5 Key Findings of Current State Analysis

Bearing in mind the objective of this research which is to build a tool with KPIs that measure the technical customer service quality against investment, it is important to look in to these aspects:

- Service quality KPIs of technical customer service.
- Customers' perceptions on quality level and valued aspects (customer satisfaction survey).
- Current method of measuring the cost of technical customer service.
- Mismatching processes.

The case company is doing well in terms of quality. In overall wholesale customers have given rNPS of well beyond 25 which shows that certainly customer centric approach has been well achieved. Especially customers have praised case company on flexibility, reachability and speed. However, the situation is not same for all functions and it seems for that reason rNPS has a significant portion of neutral (7-8) answers. A good trend is visible in the technical availability of services and technical skill level of personnel. Incident management is considered to be worse when reflecting to rivals where both communications and resolving speed require improvements. Interestingly system KPIs, like First Pass Solution or SLA-resolved-% do not indicate these problems even though those are known throughout the functions. In light of the wholesale customer satisfaction survey's competitor comparison, incident management results are not high enough, which is a setback to a customer-oriented organization. We argue that the neutral (7-8) rNPS responses could be moved to promoters (9-10) if incident management would function well in customers' eyes. In order to not increase costs but improve speed and service, several interviewees mentioned systems development, robotics and AI.

Activity	% of answers
Contact channels / Point of Contact	23%
Communications	14%
Pricing	14%
Speed	12%
Flexibility	9%
Fault handling	6%
Products	6%
Network coverage	5%
Technical skills	5%
Deliveries	4%
Network availability	2%

Table 1.   A review to the open comments of customer satisfaction survey reveals that Wholesale customers seem to value personal point of contacts and channels, competitive pricing, good frequent and clear communications, speed and flexibility.

Dozens of quality KPIs are in place. Unfortunately, OCC and Service Desk do not have same KPIs or targets. Even the way of measuring differs because of mismatches. Also, the overwhelming amount of KPIs in OCC makes us wonder if there are simply too many to reasonably understand and control the situation.

In finance Case Company is on good foundation. KPIs are in place and budget is compared to actuals each month. System allow user to deep-dive in to figures and display costs allocated per product group. One tricky question is to determine what cost-efficient customer service is. These figures are not published by any company in the industry, thus making it hard to compare. Directors seemed to be happy with their costs and how those have been balanced. Also, KPIs were considered to be good. The only major problem seems to be that OCC's financial figures do not reveal the department level in the costs.

In commercial products one financing issue is clearly the estimates. Ticketing data does not align with the allocated costs and some product groups were assigned costs that should not exist. As commercial product cost allocations are not explicitly based on any exact data it is hard to say what profitability each product group really has or what costs each function really generates. To make feasible estimates, and to validate the allocations, cost allocations must be addressed.

In the financing Wholesale customers appreciate pricing the most. Based on the customer satisfaction survey, the case company is on a good level in terms of pricing but offers substantial amount of free professional work. This is adding value to the customers

but not highly appreciated among Wholesale customers as most Wholesale customers can re-invoice the costs from their end-customers. None mentioned professional work in their open comments of the customer satisfaction survey and the interviewed Customer even mentioned that it is perfectly acceptable, as long as the cost is not a surprise but agreed in advance. Another issue with professional work is that it is not given attention enough. This was separately mentioned by two interviewees. There is no price for a Service Desk Engineer in doing this nor the cost unit itself as not even the Controllers look closely to these figures.

As a conclusion of the CSA, currently case company has no means to connect service quality KPIs with the cost KPIs. In other words, ROI cannot be measured. Mismatching KPIs between OCC and Service Desk, mismatching measurements due to different SLAs and different cost centres disable the comparison completely. Estimating is complex and untraceable. This equally stops sales from auditing the cost allocations in non-regulated products. As previous suggests, it is also not completely obvious whether all of the quality KPIs truly are needed and impact the customer value even though case company stakeholders thought those were good. Certainly, amount of KPIs is large and operations mostly do not measure same KPIs as the customer satisfaction survey.

The solution pinpoints which KPIs measure service quality best and then connects those to the cost centres via financial KPIs. Also, estimation issue is addressed. We review existing knowledge around the themes to support the conclusions.

4 Existing knowledge

4.1 Overview

This chapter reviews the existing knowledge: journal articles, studies, researches and other sources and then links relevant parts to the CSA pinch points. With the literature we mainly focus on the CSA key issue, which is how to balance costs against service quality. First in 4.1 we have an overview of what Cost of Quality (COQ) and Service quality (SQ) are, then in chapter 4.2 we look deeper in to the knowledge around COQ and Cost Of Poor Quality (COPQ). To understand whether the CSA findings about cost measurement is true, we need to highlight the activities that create costs. In chapter 4.3

we cover multiple dimensions of SQ and we find out which KPIs would be the most suitable for SQ measurement. Chapter 4.4 is balancing COQ and SQ against each other to form a steady foundation for conceptual framework and the tool itself. In 4.5 we build our conceptual framework for the proposal.

Cost of Quality is quite vast area of studies around costs (Rust et al. 2000). It can be easily mixed or linked with e.g. COPQ that is not exactly the same, although a good approach. In 1989 Juran defined COPQ as the sum of all costs that would disappear if there were no quality problems. Cost of making and overcoming mistakes is at minimum 23% but some studies go to as high as 40%. Of this every dollar is less profit and quality problems can even lead to losing customers. From Sharabi's and Davidow's (2010) work we know that it can cost up to 5 times more to acquire a new customer instead of preserving the existing one. In wholesale this is probably even more work for sales as customers are big and reluctant to switch partners. Usually to keep costs balanced, proactive approach is much better than reactive.

COQ is built from many dimensions and plenty of theories around it exist. McNair-Connolly et al. (2013) introduce Value-based Cost Management System (VCMS) that for example looks in to *waste* and eliminates it with Lean, Pareto principle explained by Ivancic (2014 p. 637) also talks about waste. Sharabi and Davidow (2010) reproduce Feigenbaum's Total Quality Management (TQM) based *prevention costs, appraisal costs, internal failure costs and external failure costs*. Anand and Grover (2015) found KPIs like *time*, *transaction costs* and *IT costs*. Ueno (2008) discuss about TQM principles that have cost impact such as *recruitment, training* and *rewards.* Many of the COQ dimensions are bundled together in the salaries that company pays to the employees which makes it hard to understand which activities are costly and which are not. Like Elmadag et al. (2008) argue, under- and overserving customers is connected to low cost-effectiveness and lost revenue opportunities, so it is important to know exactly where employee time is being consumed and select the right activities.

Service quality or SQ is often described as the comparison of expectations and outcomes of the service. It is also linked to the customer satisfaction and customer loyalty in many cases, like EPSI framework (Maritz and Nieman 2008; Rope and Pöllänen 1998; Kristensen and Eskildsen 2012; Palamidovska-Sterjadovska and Nikolina 2017). In academic literature service quality often contains several components with measurable KPIs, one example being the Total Quality Management (Ueno 2010) and another

SERVQUAL (Palamidovska-Sterjadovska and Nikolina 2017; Kristensen and Eskildsen 2014; Abu-El et al. 2013). In services, quality consists of two major elements that are the service/product itself and the process (Sharabi and Davidow 2010). The SQ is both customer perceptions and measurable (KPI) service levels that have targets. These targets can be set by the provider or they can be set by standards or competition, for example.

A move towards the customer has happened over the years. A Finnish publication by Rope and Pöllänen (1998) recommends taking action in *customer satisfaction*, which is a direct result of *service quality* (Kristensen and Eskildsen, 2012; Hyunju and Ellinger, 2013; Tseng and Wu, 2014; Palamidovska-Sterjadovska and Nikolina 2017). Another example, a 2002 study by Gurau and Rancchod, mention that companies had already recognized the need to transform from product-centric to more customer-centric. No big evolution has happened since then as Batra repeats the statement of *customer experience* (CX) in 2017 study. Gurau and Rancchod argue that it is a key competitive advantage to understand customer behaviour. Customer satisfaction influences *customer loyalty*, which in turn affects profitability through enhanced revenues, lower costs of customer acquisition, lower price sensitivity and decreased cost of serving the customers. Although, not all satisfied customers stay: transaction buyers are after price and relationship buyers after long-term relationship. Wholesale segment has both types of buyers, most seeking both low prices and long-term business in order to keep number of partners, the partner managing costs, lower. The dimensions service quality, customer satisfaction and customer experience can be easily mixed as they are closely connected but for the sake of clarity we want to underline that these are not synonyms to each other.

In principle, customer satisfaction is based on *customer expectations* and customer experiences. If expectations are higher than the actual experience, it can affect negatively in the customer retention. There are three dimensions of expectations: ideal, pre-, and minimum expectations. Ideal expectations are based on person's individual view and can be unachievable such as "no faults at all". Pre-expectations are based on evidences and visible clues around the company like marketing efforts, media, word of mouth, previous experiences or even the industry. Minimum expectations are the minimum requirements that customer is willing to agree on. Over time these minimum expectations have been increasing for example due to regulation, competition and standardizing. Customer experience dimensions are under-, balanced and overexpecting where performing better than what the customer expected (underexpecting) is positive (Rope and Pöllänen 1998).

Net Promoter Score (NPS) basically answers the experience part. On scale 0-10, customers who give rating of 9 or 10 are called Promoters and they are considered likely to exhibit value-creating behaviours. Customers who rate 7 or 8 are Passives and the rest are Detractors who might even spread bad word about the company and therefore cause harm (Wikipedia 2018). To highlight the vast number of models around the topic, based on PZB model, the difference between customer expectation and perception is called GAP5 (Jeh-Nan and Tzu-Chun 2010, p. 824).

Service quality, however, can be a level of service set by either the provider or for example the industry. It may not be related to the customer expectations or experiences at all. Sharabi and Davidow (2010) brought up Parasuraman's Gaps Model in their study. It still continues to be a standard of measure for poor service quality, related to COPQ, and it has four main sources of problems:

- *The expectations gap*, which is difference between customer expectations and managers perceptions on customer expectations.
- *The standards gap*, which is the difference between company understanding of the customer expectations and the development of service standards.
- *The performance gap*, which is the difference between service standards and the actual service provided.
- *The communication gap*, which is the difference between promises made to the customer and actual deliverables.

If above gaps are minimized or even eliminated, company can not only increase the service quality but profits as well.

A recent study investigated the customer loyalty in Macedonian mobile market. Although they conceptualized and operationalized service quality as an attitude resulting from customer perceptions of service performance, their key findings were, that service quality highly influences customer satisfaction and loyalty (Palamidovska-Sterjadovska and Nikolina 2017), thus profitability (Gurau and Rancchod 2002). Service quality can be presented in many shapes, such as SERVQUAL 5-dimensions or 2-dimensions (technical and functional).

As we have proven earlier in many occasions, service quality is strongly linked to customer satisfaction. Customer satisfaction measurement was at first transactional but has

since then evolved in 1990s to cumulative perspective of conceptualization and measurement, then into overall overview of products and provider (Palamidovska-Sterjadovska and Nikolina 2017) into trends such as inbound marketing with long-term relationship and buyer personas (Patrutiu-Baltes 2016) and customer journey mapping, interested in each customer journey end-to-end (Batra 2017). This gives us a clue that modern world looks customer satisfaction in much detail level than ever before. Ishaq Bhatti et al. (2014) argue that in order to keep up with the competitive environment, organizations must use performance management systems and KPIs. As Jeh-Nan and Tzu-Chun also argue in their 2010 study, KPIs play an important role in service quality assurance since those provide means to measure the provided quality.

To put all this in context, let's quickly review the market situation. Many researches about telecom market in India have been published over the years. The market in India is in the same situation as Finnish market is: Few players dominate the market, prices have met the low-point, competition is extreme and, in many cases, the only way to increase profits is by cutting costs (Masson et al. 2016; Tefficient 2017). Similar situation enables comparison to Finnish market. In practice, this means reducing internal costs and competing with best services to the customer such as superior service delivery. It is no surprise Masson et al. (2016) study concluded that companies which score high on both operational efficiency and service delivery effectiveness have achieved superior profitability. Telecom Regulatory Authority of India required telecoms to publish their customer service KPIs in similar manner than how Finnish Communication Regulatory Authority (nowadays Traffic Management Finland) mandated in 2009 (Finnish Communications Regulatory Authority 2018)

4.2   Cost of Quality

A tool called Total Quality Management (TQM) reveals some of the mysteries behind the costs. The goal of this business philosophy is to achieve maximum customer satisfaction by improving service quality (Ueno 2010). One of the 15 principles introduced is the Cost of Quality. In earlier study by Ueno in 2008 she looks in to the features of service quality and connects these for technological services, like telecommunications. *Culture*, for example was not significant but *communication* was extremely significant. *Teamwork* played a part but not as much as *recruitment* that impacts highly in to service quality. *Training* interestingly was more seen as a promotional, or a marketing advantage of ser-

vice quality. *Performance appraisals* and *reward* was not significant nor was the *empowerment*. These, among Ueno's results, point us to the direction of the cost variables that are at least the features.

Sharabi and Davidow (2010) introduce an extremely interesting dilemma regarding the quality costs. The foundation of their dilemma lies with Feigenbaum's and Dahlgaard's & Dahlgaard-Park's work of service quality cost types that are (quote):

- *Prevention costs*. Prevents poor quality from happening, such as quality planning, employee selection, training costs, quality assurance inspectors, and continuous improvement.
- *Appraisal costs*. Determines actual quality levels, utilizing such tools as inspections, audits, testing, and statistical sampling.
- *Internal failure costs*. Associated with correcting a service failure, before the customer learns of it, such as downtime, rework, waiting time, and backroom errors.
- *External failure costs*. Correcting a service failure after the customer has brought it to the company's attention. This includes service recovery, callbacks, warranty costs, loss of goodwill, and lawsuits.

The dilemma is a two-parter: As it is so hard to measure prevention costs, companies tend to focus on appraisal costs which takes companies to more reactive mode instead of preventive mode. The other part is manager's lack of knowledge on how much money is lost in external failures and then pleasing customer, which is yet again a reactive method. Sharabi and Davidow (2010) argue that instead it would be much cheaper to use preventive actions. Investing in to improved service quality pays off because for example recurring or doubled efforts are minimized. Later on, we will explain how to remediate these issues and introduce for example First Pass Solution KPI which is directly connected to this.

One of the key issues found in the CSA is the untraceable cost estimating and allocating. "*Assumptions always drive costs*" and "*assumptions can be fragile*" (Mislick and Nussbaum 2015). Wise words that have two key topics in them: do not just expect everything to be exact but realize the downsides. Cost estimating is a hard task. In many situations companies must rely on estimations with the costs. The budget, for instance, is an estimate that gives guidelines for spending. In bigger corporates, like the case company, it is also common to do separate estimation rounds throughout the year and clarify the

spending. Often in finance review at least three figures are formed: budget, estimate and actual.

Mislick and Nussbaum (2015) write: "*Cost estimating is the process of collecting and analysing historical data and applying quantitative models, techniques, tools, and data-bases in order to predict an estimate of the future cost of an item, product, program or task. Cost estimating is the application of the art and technology of approximating the probable worth (or cost), extent, or character of something based on information available at the time.*" The essential characteristics of any good cost estimate are completeness, reasonableness, credibility and analytic defensibility. These are such as historical data, reflection of current and potential future process, identifying ground rules and assumptions and risk evaluation. Good cost estimate is driven by requirements. If none set, it is hard to tell what to accomplish. Whenever estimates are used, one must keep in mind that a good cost estimate is traceable and auditable (Mislick and Nussbaum 2015).

Currently the cost estimations or allocations of commercial products are not traceable or auditable nor are they based on data according to the interviews of the CSA. As Mislick and Nussbaum claim, the allocations should be data based to support future planning as well. For commercial products it has not been in interest of the case company as there is no mandatory need to fix it.

Another weakness found in the CSA is linked to the estimations and allocations problem. More precisely unless this key issue is resolved, the estimation/allocation traceability cannot be done. Exporting technical customer service data from ticketing system simply does not offer 100% reliable information but our academic review of Mislick's and Nussbaum's 2015 work shows that the estimation and allocation should be based on valid historical data. In the current solution where cost accounting, billing and ticketing is separated this does not cause a widespread problem, but our target is to connect these in chapter 4.5 and conceptual framework.

Third CSA weakness that we must observe is the cost centres. The cost estimates and allocations are entered in to a cost accounting system. While income object accounting is well taken care of, we want to especially focus on different departments, cost centres, and their costs. As the CSA concluded, Service Desk department is its own cost centre and its accrued costs are easy to follow up from the accounting perspective. OCCs costs

are included in one bigger unit level cost centre which does not allow similar 1:1 account-ing view when we want to compare both ticketing performance (reported on department level) and cost performance (currently reported on unit level). Mislick's and Nussbaum's (2015) arguments about data based and analytic defensibility simply cannot be fulfilled nor can Magliozzi's (1998) European telecom profitability mappers *Return on Invest-ment, Revenue per Employee or EBITDA per Employee* efficiency-KPIs. In order to lead the business, execute the strategy and create value, KPIs must be linked correctly. Dutta (2014) has investigated this: "*The key to a successful strategy for any service provider business would be the link between the business model, the operating model, the busi-ness process and the key performance indicators or KPIs, which should cut across var-ious layers of the enterprise*". For example, the case company would benefit having uni-fied KPIs not only in the finance, but also in the operations.

We have reviewed plenty of COQ aspects and KPIs in chapter 4.1 and this chapter. And yet there is more: For example, Ishaq Bhatti et al. (2014) mention *service cost* and *han-dling time* but also *net income* and *sales*. This brings us to our last cost related weakness of the CSA: free of charge professional work. Case company offers plenty of billable work for free which is devastating for business. Employees do work, consume time and get paid for that (i.e. cost) but whenever they could invoice the work it rarely happens. This means costs and lost sales. McNair-Connolly et al. (2013, p. 7) argue that yet each prod-uct and service contain waste, which is not providing any benefits. Surely work that was left uninvoiced is a form of waste. This is potential gold that can be mined to improve profitability like Masson et al. (2016) propose. To eliminate waste, they propose use of Lean (McNair-Connolly et al. 2013, p. 43).

In chapter 4.3 and chapter 4.4 we are going to discuss about customer complaints. It has a cost aspect that we want to address already. Many companies focus solely on com-plaining customers, yet it is only 5% of the unhappy customers. A company has invisible costs that happen outside organization e.g. when customer simply switches provider in-stead of complaining. As we have mentioned earlier, preserving customers is much cheaper than losing them and acquiring new ones: It is a well-known fact that recruiting a new customer is multiple times more expensive than retaining the existing one. For example, Sharabi and Davidow (2010) ground this academically in their study. Thus, it is important to track *churn*. Many problems are presented but also solutions that work together towards lower costs in long-term run. First of all, complaints must be monetized.

How much company spends money in complaints and how much company benefits from complaint handling?

4.3 Measuring Service Quality

As McNair-Connolly et al. (2013) and Tseng and Wu (2014) argue, a company must understand customer needs to fully create value. Service quality is strongly linked to the customer satisfaction (Maritz and Nieman 2008; Rope and Pöllänen 1998; Kristensen and Eskildsen 2012; Palamidovska-Sterjadovska and Nikolina 2017) but it is not the same. Therefore, we must observe what the case company measures now and understand what should be done differently.

Case company widely uses Net Promoter Score in evaluation of success and in the external communication. Net Promoter Score (NPS) is a popular CX metric developed by Frederick Reichheld in 2003 (Grisaffe 2007). It simply asks one question about recommending x to a friend or a colleague. Responses are on a range of 0-10, whereas 0-6 are detractors, 7-8 neutrals and 9-10 promoters. The percentage of Promoters is then subtracted from the percentage of Detractors to obtain NPS. It is easy to understand, not copyrighted and often enables comparison between rivals per its high adoption rate (Batra 2017; Wikipedia 2018). One important aspect of NPS is that it measures loyalty and links it to word of mouth. That is linked into for example increased sales and higher customer retention (Munroe n.d.).

However, NPS does not seem fit. Plenty of NPS criticism has arisen immediately after publishing, such as Grisaffe 2004, 2007 and Keiningham et al. 2007. For example, in 2014 Kristensen and Eskildsen asked "Is the NPS a trustworthy performance measure?". They found "NPS to be a very poor predictor of both customer loyalty and customer satisfaction" and recommended organizations to use either American Customer Satisfaction Index (ACSI) or the Extended Performance Satisfaction Index (EPSI) Rating framework, which formerly was called European Customer Satisfaction Index or ECSI (Askariazad and Babakhani 2015). A Finnish study by Hagman in 2016 also noted that as NPS strongly reflects emotion it does not feasibly pinpoint the processes or features that fail and thus need developing. Mainly the concern seems to be that can a single value truly be the ultimate measurement in customer management or does it reflect growth at all. Even more alarming is when Grisaffe (2007) quotes inventor of the NPS, Reichheld, and mentions several industries where NPS seems to be irrelevant, such as

computer systems, cable TV and local phone. Things that the case company does! A multidimensional system, perhaps containing NPS, would be more accurate.

Internally case company uses wide-spread set of Service Quality KPIs of which some are reported to the customers. These include First Pass Resolution, Incident Resolution times, SLA fulfilment and so on. We demonstrated in the CSA that these are not unified across the company. McNair-Connolly et al. (2013) claim that they should be, and that company could benefit from doing so. Rust et al. (2000) conclude their work on service quality impacts to marketing decisions with remark that in order to make any decisions, the competitive environment must be analysed. This means competitive analysis of e.g. pricing, service quality and market share. They also have built a conceptual framework on service quality change impact on market share, prices etc. which unfortunately was not available via our sources. Now it seems that this analysis is missing, and target levels are solely set by the company and its units.

A way of measuring service quality is SERVQUAL, published by Parasuraman et al. in 1988. Their original proposal contained 5 dimensions: *tangibles, reliability, responsiveness, assurance* and *empathy* (Kristensen and Eskildsen 2014). However, the dimensions have been highly debatable throughout the history as Abu-El et al. (2013) show in their study. They propose 3 dimensions (*reliability, tangibility* and *interaction quality*) for mobile market and discovered that SERVQUAL affects positively into customer satisfaction and financial performance. Their survey consisted of questions such as "When you have a problem, my mobile operator shows a sincere interest in solving it" (reliability), "The mobile operator performs the service right the first time" (reliability), "Employees in your mobile phone operator give you prompt service" (responsiveness), "Employees in your mobile phone operator have the knowledge to answer your questions" (assurance), "Your mobile phone operator has your best interests at heart" (empathy), "Materials associated with the service (such as pamphlets or statements) are visually appealing at your mobile phone operator" (tangibles), and "I am satisfied with my mobile phone operator's service quality" (satisfaction).

A study by Kristensen and Eskildsen in 2012 builds relationship between SERVQUAL, EPSI and Index of Consumer Sentiment (ICS). 1989 Sweden was the first country to establish a uniform methodology for measuring customer satisfaction and loyalty. The Swedish Customer Satisfaction Barometer (SCSB) created by Fornell in 1990 (Askariazad and Babakhani 2015) was adapted for use in ACSI by Fornell in 1996 and after

both succeed, EU Commission started ECSI project in 1998. Eskildsen et al. designed EPSI rating framework in 2004 (EPSI rating 2018; Askariazad and Babakhani 2015; Kristensen and Eskildsen 2012). Askariazad and Babakhani (2015) proved that EPSI model is especially strong in the B2B market although one of its flaws is that it is concluded only once a year (Hagman 2016). ICS is a measure of consumer confidence from 1940s. The study found it useful and possible to merge SERVQUAL, ICS and EPSI together. Three of five SERVQUAL dimensions were significant: reliability, responsiveness and empathy (Kristensen and Eskildsen 2012).
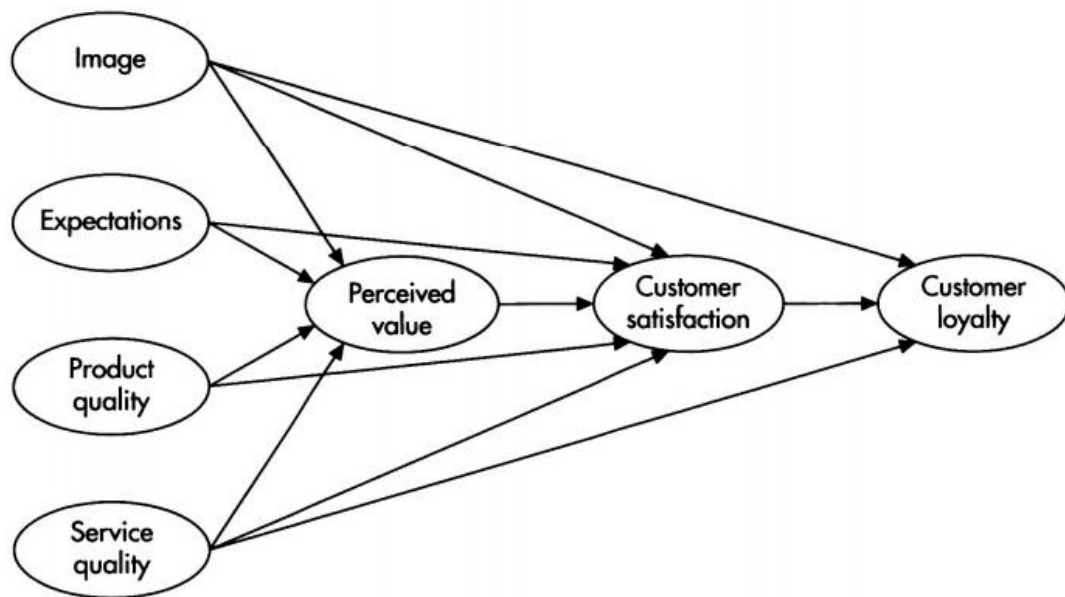
Figure 4. EPSI rating framework (Kristensen and Eskildsen 2012)

After Kristensen's and Eskildsen's study EPSI relations have been slightly modified and reinforced with *complaints* that link to the results of *customer satisfaction* and *customer loyalty* (EPSI Rating 2015). Complaints were an important part of cost and process knowledge in many sources that we found, like Sharabi and Davidow (2010), Ishaq Bhatti et al. (2014) and Anand and Grover (2015).

Ishaq Bhatti et al. (2014) discuss about several quality, time and customer satisfaction KPIs. With quality it can be, for example, *product performance*, *product reliability*, *technical durability*, *serviceability* or *perceived quality* by customer. In most cases these are not relevant to this study as we investigate customer service efforts, not products. With regards to time, KPIs include *response time*, *wait time*, *throughput time* and *order pro-*

cessing time. They also mention customer satisfaction KPIs. These can be such as *customer loyalty index*, *quality service guarantees*, *number of complaints*, *customers lost* or *number of* new *customers*. They also mention *number of customer referrals*.

One key KPI for contact centres was found to be *First Call Resolution (FCR)* which corresponds to the already in use *First Pass Solution (FPS)*. Hart et al. (2006) found that contact centres use three major KPIs: *FCR*, *customer satisfaction* and *time to resolve*. FCR was found to be among the most valued as it represents improved quality, reduced costs and higher customer satisfaction. In same study estimating FCR produced better figures than actual measurement of it. In 2006 study Robinson and Morley found that many call centres have quantitative and mainly performance related KPIs. Managers wanted to prioritize the service quality and customer satisfaction over performance KPIs such as *number of calls per agent* or *average handling time*. However, this was contradicting with the KPIs as they tried to balance between performance and quality roles.

4.4   Balancing COQ and SQ

Rust et al. (2000) mention that before their study there has not been academic studies about service quality relation to business outcomes although many studies have claimed that improved service quality leads to better financial performance via value creation. Our business problem was that we needed to connect the investments (i.e. COQ) to service quality. Companies need understanding on which activities provide the most value. Therefore, the company must recognize customer needs. It is an essence to bring the customer perspective into the equation (McNair-Connolly et al. 2013). As this study also proposes, we quote McNair-Connolly et al.: "*Unless a firm has a clear understanding of what customers expect in terms of service responsiveness, they could be spending significant sums of money on performing a variety of activities without delivering what is desired by the customer*". Customers should assign specific weights to the attributes adding up to 100%. In many cases, this is a small adjustment to marketing analysis. Then, in similar manner, costs should be allocated per activity to effectively allow Value-based Cost Management System (VCMS) to take place and reveal the costly activities. Although VCMS can be a one-time activity to e.g. validate strategy, it is more beneficial as an ongoing process. In that context, the value-added results should be reported monthly by department to implement VCMS in performance monitoring.

Unifying corporate level, so called investor key financial figures is complex in this study context as those can be tricky to calculate down to a department level. For example, use of a good investor KPI *ROCE* (Investopedia 2017) in the tool requires department level knowledge on Total Assets and Current Liabilities or Equity and Noncurrent Liabilities. Financially and mathematically it may be possible to calculate but it might not be accurate or even relevant. For example, core network, thousands of metres of fibre optics cable is part of corporate finance in assets but calculating it down to department level would require dividing the asset value per employee. EBITDA (Magliozzi 1998) is an interesting candidate for the financial KPIs as is possible to calculate down to each cost centre (department) level. It takes in account necessary current figures like accounts receivable and salaries but disregards typically high depreciation and amortization of telecom: in 2017 case company's EBITDA was 271,8M€ but EBIT only 126,6M€. Sadly, taking it to the cost centre level (instead of product) requires great thoroughness and understanding of the activities performed. It also depends heavily on other factors, one being the sales margins, besides just customer service that we have in our scope. The same issue is quite persistent with the other financial "top level" KPIs.

Resolution of the study objective requires financial KPIs that can be influenced within the customer service departments. We need to look in to the cost activities and determine the suitable cost KPIs. Academically well-grounded and activity-based costs, that could form McNair-Connolly et al.'s (2013) VCMS, are TQM based Feigenbaum's *prevention costs, appraisal costs, internal failure costs* and *external failure costs* introduced by Sharabi and Davidow (2010). To support the estimation process, we will use *handling time (24/7).* We also need to bear in mind that financial performance measurements are important for strategic decisions and external reporting, but day-to-day operations are better handled by non-financial measures as Anand and Grover (2015) point out.

In table 2 we bring in all dimensions of COQ and SQ and select the relevant ones for technical customer service. For COQ we select the relevant cost dimensions and for SQ we use the customer perspective. For example, customer acquisition is not relevant for technical customer service nor is the customer expectations that are often pre-expectations set by advertising or word-of-mouth. The relevancy of the dimensions is challenged by the stakeholders in the case company when building the proposal in chapter 5.

COQ dimension	COQ Relevance in technical customer service	SQ dimension	SQ relevance in technical customer service
Customer acquisition		Complaints	X
Waste	X	Customer satisfaction	X
Planning / service development	X	Service quality	(X) top level term
Recruitment	X	Customer expectations / tangibles / image	
Training	X	Customer loyalty / loyalty index	
Inspection		Customer experience (CX)	X
Audit		NPS	X
Testing		GAPS and competitive analysis	
Statistics	X	Culture	
Downtime / service recovery	X	Communication / interaction quality	X
Rework / recurring / doubled work / callback	X	Teamwork	X
Wait time	X	Performance appraisals	
Backoffice errors		Empowernment	
Warranty	X	FCR / FPS	X
Lawsuit		Reliability	X
Transaction cost	X	Responsiveness / response time	X
IT costs		Assurance / quality guarantees	X
Rewards	X	Empathy	X
Professional work	X	Product quality, reliability, durability, serviceability	
Churn	X	Perceived value	X
		Wait time	X
		Number of customers lost	X
		Number of new customers	
		Number of referrals	X
		Time to resolve / order process time / throughput time / Average handling time	X

		Number of cases per agent	X

Table 2.   Relevance of COQ and SQ dimensions from customer perspective.

After finding the relevant dimensions we built a matrix that connected all the COQ dimensions to service quality dimensions. The full matrix is available in appendix 1. The connections between the dimensions are created based on the existing literature, CSA interviews, company documentation (data collection) and personal expertise. Connections between the dimensions in CF are reviewed and challenged in chapter 5 by the case company stakeholders.

The full matrix can be used to see how different investments impact on certain service quality aspects. For example, we can quickly see how relevant training is regarding service quality. However, there are too many vague dimensions that cannot be measured precisely, like COQ dimension recruitment (and all efforts put in to it) or communication quality. We know from EPSI framework (Kristensen and Eskildsen 2012) that most of the dimensions can be measured by simply asking customer perceptions. Thanks to Hagman (2016) we know that for example NPS strongly reflects emotion which is really not an exact measure at the end. As demonstrated earlier NPS has many other flaws as well. This is why we have chosen only clearly measurable investments and SQ KPIs to the CF. We have been proven the need for customer feedback which is obvious even without all the existing literature presented earlier, and so we decided to keep customer satisfaction as a one SQ KPI. As we mentioned earlier, for the sake of clarity, the chosen cost and SQ dimensions are reviewed by key stakeholders of the case company when building the proposal in chapter 5.

4.5   Conceptual framework

Figure 5 displays our conceptual framework and after the figure follows explanations and sources of each dimension or KPI.

	Time to resolve [8]	Customer satisfaction [9]	Responsiveness [10]	Wait time [11]	Complaints [12]	FCR / FPS [13]
Training [1]	X	X	X		X	X
Downtime / service recovery [2]	X	X	X	X	X	X
Churn [3]	X	X	X	X	X	
Warranty [4]	X	X	X	X	X	X
Transaction cost [5]	X		X			X
Professional work [6]	X			X		
Rewards [7]	X	X	X	X		X

Figure 5. Conceptual framework with COQ dimensions in y-axle and SQ KPIs in the x-axle.

COQ dimensions

- *Training[1]* (Sharabi and Davidow 2010; Ueno 2008) is the first COQ dimension and got the highest scoring in the matrix. This simply means that investing into training impacts a high number of SQ dimensions. Training means all sorts of training given to the employees, which can be for example internal training sessions, colleague assistance or external bought trainings like certification trainings and certification exams. These costs can be calculated from salaries (time spent) and external costs.

- *Downtime[2]* (Sharabi and Davidow 2010) is a cost whenever it occurs. In this case we discuss and mean specifically internal downtime: naturally any call centre wants to be active every minute the employees are present. If any downtime occurs for example due to network problems, phone system issues, internal system issues, fire alarm, strike, holidays or anything similar, it costs money to the company. These downtimes can be measured by calculating lost time due to certain downtime-event.

- *Churn[3]* (Ishaq Bhatti et al. 2014; Sharabi and Davidow 2010) is a customer specific measure that can be quite easily measured from termination orders. The question churn answers is "How much revenue the company lost because of contract terminations in a specific timeframe?". Customer service can assist in many ways to avoid churn, although it is not only up to the customer service. Many other elements like sales, prices and technical reliability affect churn.

- In our study context w*arranty[4]* means Corporate business SLA credits and for example legal costs (Sharabi and Davidow 2010). As we look the cost elements from technical customer service perspective, we can set the legal costs mainly aside. Only in case where customer service would have made a clear mistake that leads to e.g. lawsuit, would the warranty costs exceed. A typical case, however, is a Corporate business SLA credit request from a customer due to prolonged resolution time.

- *Transaction cost[5]* means all the costs that normal day-to-day work accrues (Anand and Grover 2015). Not always employees are in training or waiting for internal systems to come back up. A normal case has a certain cost that can be measured from time that the agent spent to complete it and then by comparing it to the HR costs, IT costs and so on.

- *Professional work[6]* is very interesting measure as it actually is a cost only when it is done for free. This did not arise clearly in the existing literature but rather from the interviews and CSA, so it has been included. Usually professional work is an income element that the case company could certainly utilize much more. It can be measured from the accounting directly as it is invoiced from customers in form of money. Unfortunately, it is extremely complex to measure professional work as a cost as often there is no way to determine which work was supposed to be invoiced and the cost is more of an estimation.

- *Rewards[7]* (Ueno 2008) are something that come on top of the salary. Those can be monetized, like bonuses or provisions, or those can be something more concrete everything from a cake to all sort of presents. Rewards are fairly simple to measure as long as those are clearly separated in cost accounting.

SQ KPIs
- *Time to resolve[8]* (Hart et al. 2006; Ishaq Bhatti et al. 2014; Robinson and Morley 2006) gained high score in the matrix meaning that it influences many cost elements (in good and bad). Time to resolve is usually measured from ticketing system which calculates either 24/7 resolution time or SLA specified resolution time. It can be measured also from phone call durations. Customers respect fast resolution times, although it is not always necessary to be quick.

- *Customer satisfaction[9]* (Abu-El et al. 2013; Grisaffe 2007; Hart et al. 2006; Ishaq Bhatti et al. 2014; Kristensen and Eskildsen 2012 and 2014) is a perception KPI

which requires a questionnaire or an interview with customers. It can be measured using several models, but we specifically recommend using EPSI (Kristensen and Eskildsen 2012) to reveal some other influencial KPIs too.

- *Responsiveness*[10] (Abu-El et al. 2013; Ishaq Bhatti et al. 2014; Kristensen and Eskildsen 2012 and 2014; McNair-Connolly et al. 2013) can be measured very simply. It is the time that customer needs to wait for the first response, whether it is waiting for someone to pick up the phone or someone to reply to the email. Often with email and other ticketing integrations response time is measured by using statuses. For example, ITIL provides a framework that can be used for many SQ measurement and monitoring purposes. When measuring response time, it is important to set the targets correctly. This means evaluating human behaviour and analysing rivals. Perhaps 10 seconds latency in phone is ok but 30 seconds is already too much.

- *Wait time*[11] (Ishaq Bhatti et al. 2014; Sharabi and Davidow 2010) means the time customer needs to wait before someone comes back to a follow up question. It can be blended with responsiveness measurements but in our context and study we separate these two measures. Measuring wait time requires a ticketing system where ticket is automatically set to a pending response status when customer asks a follow up question. Also, this status should be used manually whenever customer has been promised a more detail response after investigation or other internal tasks. Wait time is part of the time to resolve.

- *Complaints*[12] was appearing in many previous studies and thus is an important aspect to measure (Anand and Grover 2015; EPSI Rating 2015; Ishaq Bhatti et al. 2014; Sharabi and Davidow 2010). Several methods can be applied to complaints measuring and it can be even asked from the customers in a survey. In our opinion the best way to measure complaints is to use ticketing where a ticket is flagged whenever there is a complaint. Number of complaints can not only tell about customer service quality but in general about state of the company and its products. Targets must be scaled against the company size and most likely the best way to measure complaints is to use percentage of all contacts.

- *First Call Resolution, First Pass Solution, First Time Resolution*[13] etc. was introduced to us in the CSA interviews and in the studies by Abu-El et al. (2013) and Hart et al. (2006). FCR is measuring how often customer get his/her answer "on first time", without a need to come back to the matter. It also can be measured several different ways by asking it from customer or more preferably by measuring it from the phone system and ticketing system. If e.g. same number calls

many times during the same day, it may indicate an FCR issue. If a ticket contains more than few emails (one inbound and one outbound), it can indicate an FCR issue. The case company currently measures ticket status progress which may leave some cases FCR "yes" even though customer had to exchange several emails. It is also possible that a customer did not leave enough information originally to resolve the case using proper FCR measure, which leads to follow up questions before actual processing, so we leave this decision up to the managers.

It is an essence that enough data is gathered when measuring service quality KPIs. For example, customer satisfaction as a perception measure requires preferably hundreds of answers so the fluctuation is not producing incorrect answers due to low number of answers.

5   Preliminary proposal

We started off the proposal building in accordance to what we had learned from the CSA and the existing knowledge. The preliminary proposal was built in two workshops with key stakeholders of the departments and Business Controllers. First workshop took place in March 2019 and included Sales Director of Wholesale, Department Heads of SD and OCC and the Business Controllers of respective units. Second workshop was conducted with the Business Controllers only on the next week. To prepare for the workshops, we created 2 proposals as a starting point for discussions.

The proposal was a two parter. As estimations have been an issue in the case company, we proposed a separate solution to the cost allocating: a data-based cost allocation. We used resolution time totals to calculate the product group level of time consumed and allocated the costs according to that. This requires a baseline to be set that is then added with variables, i.e. resolution times of all phone calls and tickets to be recorded, and both product group and customer segment identified.

Like we mentioned in chapter 4.2, for the actual tool to be valid, estimations have to be clarified and cost drivers must connect to the actual performance data. This is not only easing up the cost driver setting for Department Heads, but it also enables review and validation in the business. To accomplish this, we use the data-based cost allocation

matrix in table 3 and simply allocate the costs (i.e. set the cost drivers) according to those percentages.

As customer costs must be made visible (Gurau and Rancchod 2002), we recommend that OCC unit will create a separate cost centre for OCC department with appropriate income object accounting. Otherwise the proposal in this chapter cannot be used for OCC department only. Same applies to OCC's other departments.

Table 3 proposal has been built jointly with the Business Controllers in the second workshop. It contains initial, workshop 1 components but has been heavily modified to clearly separate e.g. OCC and SD functions. Original setup did not contain minimum presence requirements that have been added. In the second workshop Business Controllers felt that the solution is covering required aspects, bearing in mind the scope of the thesis.

Depart-ment	Segment	Activity	Product group 1	Product group 2	Product group 3	etc.
Service Desk	Wholesale	Minimum headcount hours based on 24/7 services sold	hh:mm (%)	hh:mm (%)	hh:mm (%)	
		Phone call handling time (total)	hh:mm (%)	hh:mm (%)	hh:mm (%)	
		Ticket resolution times (24/7)	hh:mm (%)	hh:mm (%)	hh:mm (%)	
		Totals SD wholesale	hh:mm (%)	hh:mm (%)	hh:mm (%)	
	Retail	Minimum headcount hours based on 24/7 services sold	hh:mm (%)	hh:mm (%)	hh:mm (%)	
		Phone call handling time (total)	hh:mm (%)	hh:mm (%)	hh:mm (%)	
		Ticket resolution times (24/7)	hh:mm (%)	hh:mm (%)	hh:mm (%)	
		Totals SD retail	hh:mm (%)	hh:mm (%)	hh:mm (%)	
	Totals Service Desk		hh:mm (100%)	hh:mm (100%)	hh:mm (100%)	
Operator Contact Centre	Wholesale	Minimum headcount hours based on 24/7 requirements	hh:mm (%)	hh:mm (%)	hh:mm (%)	
		Phone call handling time (total)	hh:mm (%)	hh:mm (%)	hh:mm (%)	
		Ticket resolution times (24/7)	hh:mm (%)	hh:mm (%)	hh:mm (%)	
		Totals OCC wholesale	hh:mm (%)	hh:mm (%)	hh:mm (%)	
	Retail	Minimum headcount hours based on 24/7 requirements	hh:mm (%)	hh:mm (%)	hh:mm (%)	
		Phone call handling time (total)	N/A	N/A	N/A	
		Ticket resolution times (24/7)	hh:mm (%)	hh:mm (%)	hh:mm (%)	
		Totals OCC retail	hh:mm (%)	hh:mm (%)	hh:mm (%)	
	Totals Operator Contact Centre		hh:mm (100%)	hh:mm (100%)	hh:mm (100%)	

Table 3.   Data-based cost allocation matrix for commercial products.

In this training we focus only to the two departments in the centre of technical customer service who also accept phone calls. We are aware that there are several other functions within the case company that are not being accounted but they are out of scope. Table logic can be implemented virtually anywhere. Minimum headcount hours are calculated

based on individual company requirements. For example, Service Desk and OCC serve customers who have purchased 24/7 services. Amount of these services indicate how many hours case company needs to dedicate to on-duty actions, in case there is a need to act in the middle of the night. Although, several other tasks are carried out in the night shift too.

The matrix can be used by a single unit or department as long as the totals sum up to 100% and only the costs accumulated by the unit or department are used.

Earlier in chapter 1.4 we set the objective and outcome of the study: "*The objective of this study is to build a tool with KPIs that measure the technical customer service quality against investment. Outcome of the thesis is a tool with KPIs that measure the technical customer service quality against investment*". We have addressed a key issue with the figures in cost allocations. Second, and main part of the proposal building was the outcome of this study: the tool, that is built on the foundation of conceptual framework presented in chapter 4.5.

A financial dimension needs to be connected with the service quality KPIs. The tool is built on the cost centres that should be the same as what is being measured in the customer satisfaction survey. For example, if OCC represents one cost centre, customer satisfaction survey should ask question(s) related to the satisfaction of OCCs performance.

As with the estimations, the tool building begun from initial proposal built by us. The reasoning was to be fair and minimize time consumption of the very busy stakeholders. The COQ-index tool provides user with index-numbers calculated from percentage scaled scores. This is because we want all the dimensions and KPIs to be equal to each other. This allows departments to better their scoring in any section of the matrix and thus impact the overall scoring. Scaling must be done at first: for each KPI we need to choose a zero percent level and a hundred percent level and then fix them to enable historical comparison. All scores combine from both cost and quality KPI and can be maximum of 1+1 = 2 (100%+100%=200%). After all the related matrix sections are populated, overall averages can be calculated for each investment dimension or each SQ KPI – the tool works both ways but is intended for investment estimation. To compare departments against each other, a matrix must be filled for each department, take an

overall average over all figures and see which department gets highest score displayed in table 5.

At the workshop the conceptual framework and the principles of the tool were presented to the stakeholders. We were delighted to see all participants looking it through different angles giving many comments and challenges. For example, Business Controllers asked if the SQ KPIs could be somehow converted to monetary values like cost KPIs to ease the calculations and comparisons. However, the workshop did not see any feasible way to produce such conversion. Participants also had a lengthy discussion about the external subcontractor works and their costs. Although the question is absolutely valid, it is out of the scope of this study. Eventually only one dimension was slightly adjusted which was great in terms of our research and initial proposal. The stakeholders were extremely happy on the coverage of the dimensions and believed that, although in the limited department scope, it was suitable for its purpose. The adjustment was made to the FCR/FPS dimension and is visible in table 4. Instead of calling it First Call Resolution, we name it *First Call Handling* (FCH). The difference is simple: FCR asks "did you get your issue resolved at the first call?", while FCH asks "did you get someone to start working on your issue at the first call?". In many occasions additional questions are asked to provide the customer the best and most accurate solution. Asking clarifying questions does not directly mean that the service quality is degraded.

Let's have an example where we calculate two KPI scores and build the COQ-index of them. First, in costs, the company has hypothetically decided that 0% level for training costs per employee (in the department) is 3000 euros in a year. The 100% level is 0 euros in a year. Scaling is done between these numbers linearly. If company then spent 2000 euros on training per employee, the scaling result is 33,3%. Secondly, in service quality, the company has set 0% level for average time to resolve to be 48 hours and 5 hours for 100% level. We immediately see that the targets in scaling do not need to be impossible to reach but this is left for the company to decide. If company then gets result of 10 hours, this means 88,4% level. COQ-index in the matrix for these KPIs would be 0,333+0,884 = 1,22. This final result is filled in to the matrix in the *Training+Time To Resolve index* section.

Index is calculated only to the sections that have a relation per our conceptual framework. For example, customer satisfaction and transaction cost does not have a relation, so index calculations are not done. All index calculations are explained in table 4. Since

this study is public, the workshop did not assign real threshold values for the KPIs as the information is classified by the case company. Thus, the table 4 figures are imaginary for illustrative purposes. We point out that like Rust et al. (2000) argued, a competitive analysis should be made when making decisions about these thresholds. Setting the thresholds requires also a review to the historical data of such KPIs – and a tough target setting session. Neither the 0% or the 100% level can be set too lightly as this tool is not really usable in case nothing is achievable, or all is achievable. Therefore, the Case Company must find a quite wide range between the minimum and the maximum. In terms of the tool, we think it would be the best if both ends would be virtually unreachable.

Dimension / KPI	Explanation	YEAR 0 %	YEAR 100 %
Training	Money spent on training scaled per employee.	3000 €	0 €
Downtime / service recovery	Money lost because of employees are not working incl. holidays. Scaled per employee.	5000 €	3000 €
Churn	Amount of churn over provided services scaled per employee.	10000 €	5000 €
Warranty	Amount of Corporate business SLA credits scaled per employee.	3000 €	0 €
Transaction cost	Total cost of employees / Amount of tickets over all employees	100 €	25 €
Professional work	Money earned scaled per employee.	500 €	5000 €
Rewards	Rewards paid scaled per employee	5000 €	500 €
Time to resolve	Average resolution time (hours) over all cases handled incl. phone calls and tickets.	48h	5h
Customer satisfaction	Retrieved from EPSI	50	90
Responsiveness	Average response time (hours) over all cases handled incl. phone calls and tickets.	1,5h	0,25h
Wait time	Average time customer needs to wait for an answer per case. Only tickets.	16h	4h
Complaints	Number of complaints scaled per employee	30	10
FCH	Average FCH (%) over all cases handled.	80 %	95 %

Table 4.   KPI calculations and scaling examples.

The produced matrix calculations can be used to formulate an overall average of a department. This enables comparison between the departments demonstrated in table 5.

	Service Desk	SD 2nd level	OCC	OCC 2nd level	Etc.
Average COQ-index	A	B	C	D	

Table 5.   Comparing departments in high level.

The tool will produce an index number for each cost centre that has been evaluated by the customers in the customer satisfaction survey. For the tool to function properly, following limitations must be acknowledged:

1. Only Wholesale commercial product related financial figures can be used as customer satisfaction survey is conducted per customer segment, in this case Wholesale.

2. SQ time variables must be calculated on the same baseline SLA, for example Corporate business SLA.

3. Customer satisfaction survey must produce a figure per cost centre that is comparable between all cost centres. This tool does not apply if only one figure for the whole segment or company is produced.

4. If comparison to previous years must be enabled, the target levels cannot be changed once set.

The tool allows production units or departments to have a single index number on their performance. This enables better focus on improving key areas of importance in terms of financial performance and customer satisfaction. Units can improve EBITDA by reducing costs and increasing earnings through for example professional work sales. We have demonstrated that service quality can be improved by focusing on the KPIs in the SQ part of conceptual framework.

The secondary tool allows Sales to validate the allocated costs as cost drivers are based on actual data. Business Controllers can run the drivers directly from the system and no discussion about validity is required. Estimating and budgeting is also easier as the drivers can be run at any time for any period, thus making the use of real historical data possible.

6   Validation of the proposal

6.1   Validation round

For the validation of the proposal, VP of Wholesale, and Directors of each unit were invited to a validation meeting in April 2019. Although the stakeholders were given the opportunity to read the material in advance, we presented business problem, objective, outcome, existing knowledge and proposals to be clear about as many details as possible within a short time granted. Unfortunately, one of the Directors was unable to attend the meeting at the end but frankly we were able to gather the validation information.

The stakeholders were presented with the cost allocation issue and resolution how to fix it according to the workshops' view. Although they agreed that with the commercial products such problem exists, they noted that as company finance works on higher business level, the exact figures split per wholesale and retail do not matter in the big picture. Nevertheless, they argued that such improvements in the cost allocation would benefit more exact product level profitability calculation. Also, they agreed that the proposed data-based allocation would ease the workload from Department Heads and Business Controllers. They commented on the *minimum headcount hours* KPI, that they would rather see *required headcount* instead. Talking about minimums may lead to misunderstood conclusions.

Actual tool, measuring CoQ against SQ, was presented to the stakeholders. They immediately noted that there are several other key cost elements that the study does not include, but that they do understand the scoping and limitations the study. Such cost elements include HR, IT, facilities, etc. In overall they liked the idea of being able to connect the costs more closely with the actual service quality.

The biggest flaw that the stakeholders found was the threshold setting. As it is not based on any industry standard or evidence, it may guide the company to wrong direction. The study does only have examples available and nothing based on facts. If the company is self-setting the targets, it might be that rivals have much higher expectations on same or similar targets. We naturally explained that none of the figures are published by anybody, so it is impossible to set the thresholds. If the telecom industry would have such target levels standardized, the situation would be completely opposite.

In overall the stakeholders were satisfied on the results and pleased to see new innovative approach to the CoQ-SQ balancing. The cost allocation problem was also triggering lots of discussion, so we conclude it was necessary and helpful to address it.

6.2   Final proposal

Final proposal is as tables 3 and 4 indicate as no significant alterations were required by the Director level.

6.3   Recommendations

We recommend the case company to implement the proposed process aids and solutions to be able to improve both financial data quality and CoQ-SQ balancing. We know that the theoretical tools cannot be directly embedded to the current systems so to enable the tools we encourage to replace the cost centre system in OCC unit and implement EPSI and other KPI findings across the units. Overlapping and mismatching processes should be addressed as soon as the KPIs have been jointly agreed.

7   Discussion and conclusions

7.1   Summary

This study was conducted between years 2018 and 2019 in parallel with the internal-researchers own full-time work. During the study we were able to learn a great deal on the financial side of the case company and also the Service Quality production of the case company. Case company was arranging possibility to interview the stakeholders and the stakeholders were with open minds when the topic was discussed.

Due to some restrictions, parts of this study have been classified. As much as possible has been left public for the academic world to benefit from the study.

7.2 Practical and managerial implications

COQ-SQ index tool can be implemented to the practice in Service Desk unit with modest change effort. In OCC unit the toolkit requires major changes in finance that may not be feasible to conduct in short term.

As we stated in chapter 5, it is a key essence that the thresholds of the tool are selected properly based on both competitive analysis of rivals and on internal historical data. Neither the 0% level or the 100% level can be set in a way that those are most likely reachable as this renders the whole tool useless. The goal is to be able to see how changes in investments, the Cost of Quality dimensions, impact the Service Quality KPIs and if the result is always 0% or 100% this cannot be done.

Cost allocation proposal can be done in both units with modest change effort. All the data is being gathered already but the processes require some alteration to fulfil the allocation tools input need.

7.3 Evaluation of the Thesis

This study has been conducted in an academic manner and it has been supervised by the University of Applied Sciences Lecturer throughout the process. The Thesis was evaluated by two Lecturers from the University of Applied Sciences. It has been also read and analysed by five senior level stakeholders of the Case Company.

7.3.1 Outcome vs. objective

The objective of this study was to build a tool with KPIs that measure the technical customer service quality against investment. Outcome of the thesis was supposed to be a tool with KPIs that measure the technical customer service quality against investment.

As an outcome we have built a relevant tool, after investigating the current state and reading existing literature, theories, etc. about Cost of Quality and Service Quality. Additionally, we have addressed a significant issue with the input data quality (the cost allocations) and therefore improved the result.

The outcome of this study is as expected. The COQ-SQ tool provides an interface to balance costs against investments, it takes in consideration the department size and therefore allows full comparison between the departments. The KPIs are based on research data and topped with some additional telecom specific KPIs.

7.3.2 Words on Generalisability and Transferability

This study is conducted mainly as a qualitative case study for the case company. Generalisation or transferring the results was not the goal of the study and thus making direct assumptions in other contexts may be misleading.

The study, however, is based on available theories such as SERVQUAL, COQ, EPSI, Lean, etc. and these can be implemented in practice to many situations. We encourage to learn from the proposal we have built and to implement similar COQ-SQ balancing in other companies or industries as well. For IT industry the toolkit could be more usable with smaller requirement of tweaking, but it solely depends on the industry and country specific environment. This study focuses on commercial products of wholesale, which heavily impacts how customers behave and how this tool works.

7.3.3 Reflection and afterword

Conducting this study has been a journey to the inside-researcher. A vast amount of data has been handed over and many we simply had to cut out. Like we have many times mentioned earlier, there are several other COQ dimensions that have been left out on purpose from this study.

Future studies could benefit from investigating a broader aspect of costs, like all external costs for example. Lots of work is outsourced in all telecoms in Finland and we did not simply have the opportunity to touch the matter at all.

Plenty of this study's parts could be own studies as well. For example, investigating how Service Quality impacts sales would be extremely interesting. More interesting would be to compare wholesale and retail customers and see how they differ from each other. We suspect that the difference is big. During the study we also faced many invisible costs,

such as recruitment costs additional worktime. How much does a team leader or department head actually use time on preparing a recruitment or how much the time consumption is when the decision is at hand? All the KPIs and dimensions of this study could be one own study aiming for even more qualitative and perhaps standardized KPIs.

During the study we planned on making a model for earnings allocations as it seemed very intriguing, especially in case where the earnings are generated in traditional cost units. This could be perhaps the professional work income. Although there certainly are studies around the subject, a telecom industry study would be interesting.

Last but not least we'd like to see a study about the threshold setting. We were unable to standardize the thresholds as there are no feasible data on it available. We estimate that acquiring such knowledge on the Service Quality KPIs could be fairly easy. A harder task would be to evaluate and standardize the Cost of Quality dimensions as most companies protect the data as business secrets.

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Full COQ/SQ balancing matrix

	Rewards	Professional work	Transaction cost	Statistics	Waste	Planning / service development	Warranty	Rework / recurring / doubled work / callback	Recruitment	Churn	Wait time	Downtime / service recovery	Training
Time to resolve	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
Customer satisfaction	✕			✕		✕	✕	✕	✕	✕	✕	✕	✕
Responsiveness	✕		✕	✕	✕		✕		✕	✕	✕	✕	✕
Wait time	✕	✕		✕	✕		✕	✕	✕	✕	✕	✕	
# of cases per agent			✕	✕	✕	✕	✕		✕	✕	✕	✕	✕
Complaints				✕	✕	✕	✕	✕	✕	✕	✕	✕	✕
CX		✕				✕	✕	✕	✕	✕	✕	✕	✕
FCR / FPS	✕		✕	✕	✕		✕	✕			✕	✕	✕
Perceived value		✕				✕	✕	✕	✕	✕	✕	✕	✕
# of customers lost			✕	✕	✕			✕	✕	✕	✕	✕	✕
# of referrals	✕		✕			✕		✕		✕	✕	✕	✕
NPS				✕		✕		✕		✕	✕	✕	✕
Communication quality		✕	✕	✕	✕				✕	✕			✕
Teamwork		✕	✕					✕	✕			✕	✕
Assurance			✕		✕		✕	✕	✕				✕
Empathy		✕					✕				✕	✕	✕
Reliability						✕	✕			✕			✕