

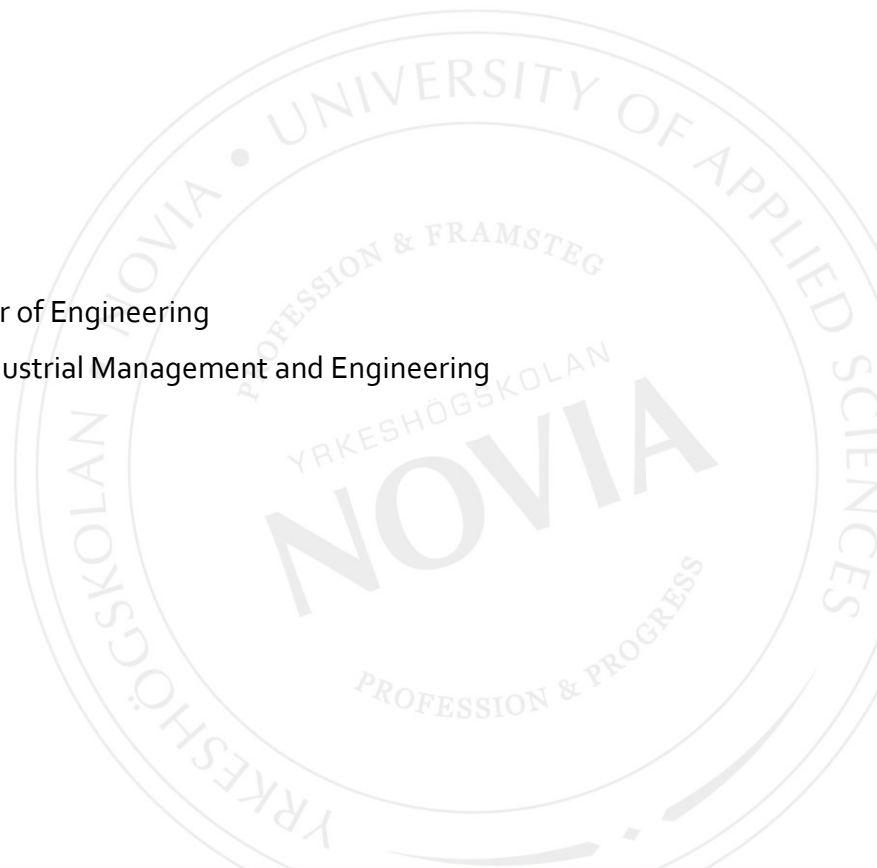
Study on Margin Deviation in Long Term Service Agreements for Engine Power Plants

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BACHELOR'S THESIS

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Abstract

This Bachelor's thesis is made for Wärtsilä energy business and is centered around the margin of a service agreement during different stages of its life-cycle. The problem to be studied, are variations in the margin of an agreement during the cost estimation, sales stage, financial mobilization, and active lifetime of the agreement.

The purpose of the study is to identify possible problems or improvement suggestions for processes related to tracking the margin of long-term service agreements for engine power plants.

The methods used in the studies done as part of the thesis, have been a mix of analytic work through manual data quality checks and qualitative interviews with contract managers to gain insights into factors affecting the margin of the agreement.

The result of the thesis is a number of improvement suggestions or solutions to the factors found to be affecting the margin within the agreement or reasons found to be affecting the data quality in software used to track the development of the agreement's margin. These are presented with possible ways of implementing the changes within the organisation.

Language: English Key words: Agreement, deviation, margin, maintenance, lifecycle

EXAMENSARBETE

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Titel: Studie av avvikelser i marginaler inom långsiktiga serviceavtal för motorkraftverk

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Abstrakt

Detta examensarbete är gjort för Wärtsilä Energy business, och är centrerat kring underhållsavtals marginaler under olika skeden av dess livscykel. Problemet som undersöks är variationer, eller avvikelser, i ett avtals olika livsskeden. Dessa är kostnadsestimeringar i förberedande arbete, försäljningsskedet, finansiella mobiliseringen och sedan avtalets aktiva livstid.

Syftet med studien är att identifiera möjliga problem eller förbättringsmöjligheter för processerna relaterade till uppföljningen av marginalerna i långsiktiga serviceavtal för motorkraftverk.

Metoderna som använts som del av examensarbetet har varit en blandning av manuellt analytiskt arbete genom kontroller av datakvalitet samt datahygien och kvalitativa intervjuer med individer i företaget som är ansvariga för avtalens genomförande och andra människor inblandade i processen för att få insikter i faktorer som har påverkat avtalens marginal.

Resultatet av examensarbetet är ett antal förbättringsförslag och lösningar på faktorer som har identifierats som har påverkat marginalerna inom avtalen eller orsaker som påverkat datakvaliteten i mjukvaror som används för att följa upp marginalerna i avtal. Dessa förbättringsförslag presenterade med möjliga sätt att implementera förändringarna i processerna och företaget.

Språk: Engelska

Nyckelord: Avtal, avvikelse, marginal, underhåll, livscykel

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Nimike: Tutkimus moottorivoimalaitosten pitkäaikaahuoltosopimusten
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Tiivistelmä

Tämä opinnäytetyö on tehty Wärtsilä Energy Businekselle, ja on keskitetty pitkäaikaisten huoltosopimusten marginaalien poikkeuksiin niiden eri elämänvaiheissa. Ongelma jota tutkin, on poikkeamat tai vaihtelut sopimuksen eri elämänvaiheissa. Nämä ovat kustannusarviot valmistelutyössä, myyntivaihe, taloudellinen mobilisaatio ja lopuksi sopimuksen aktiivinen elinikä.

Tutkimuksen tarkoitus on löytää mahdolliset ongelmat ja/tai parannusmahdollisuuksia prosesseihin liittyen marginaalien seurantaan pitkäaikaisissa huoltosopimuksissa moottorivoimalaitoksille.

Menetelmät, joita opinnäytetyössä on käytetty ovat sekoitus manuaalisesta analyttistä työstä tietojen laadun tarkistusten sekä datahygienian ja laadullisten haastattelujen avulla yrityksen henkilöiden kanssa, jotka ovat vastuussa sopimusten toteuttamisesta, ja muihin prosessiin osallistuviin henkilöihin saadaksesi käsityksen tekijöiden marginaalista

Opinnäytetyön tulos on useita parannusehdotuksia ja ratkaisuja tunnistettuihin tekijöihin, jotka ovat vaikuttaneet sopimusten marginaaleihin tai syihin, jotka ovat vaikuttaneet sopimusten marginaalien seurantaan käytettyjen ohjelmistojen tietojen laatuun. Nämä parannusehdotukset esittivät mahdollisia tapoja toteuttaa muutokset prosesseissa ja yrityksessä.

Kieli: Englanti

Avainsanat: Sopimus, poikkeama, marginaali, huolto, elinkaari

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1 Introduction

During the summer of 2020, I worked as a trainee within Contract Mobilisation, where I worked with the financial mobilisation of agreements and got to work with setting up contracts in the estimation software Estimo. Through this, I then continued as an On-Call trainee within the same team and got the possibility to work on my bachelor's thesis. Being part of the same team and doing the same types of tasks I did during the summer has helped a lot to have an insight into parts of the processes I will be studying as part of my work with the thesis.

1.1 About the thesis

This Bachelor's thesis is made for and in co-operation with Wärtsilä Energy business and is focused on long-term service agreements for engine power plants. Within almost all types of long-term agreements, there are deviations within the revenues and/ or costs covered by the contract, which leads to deviations in margins during the lifetime of a contract. Contracts go through several phases, of which one of the first ones is sales calculation which the sold contracts margin will be based on. This initial margin sets the goal for the contract to match, but in some cases, the margin may vary in practice to some extent. The next step after a contract is won is the mobilisation. The mobilisation contains several categories of work, but in this study, the relevant part will be the financial mobilisation. This is where the figures from the initial sales calculation are fed into a program, where all costs are mapped out during the lifetime of the contract. Already in this stage, there are often variations in the estimated margin due to insufficient or outdated information from the sales calculation, which is often done anywhere from days to even years before a deal is closed. The following step is the actual lifetime of the contract, where actual costs and revenues are updated each month. During this stage the margin can vary slightly, but one can at least see if the margin is going up or down, and make qualified assumptions based on that where the final margin will land.

1.2 Problem and aims of the study

Variations in margin is a problem which many companies face, due to changes in circumstances that one cannot always predict accurately enough to include in the planning stages of a contract except in the form of risk reservations. In this case, I have gotten the task to analyse and find reasons for these kinds of deviations in long term service agreements in engine power plants. These contracts can often include quite a large scope of engines and components over a long period of time and can therefore be quite complicated to predict costs for.

The problem I, therefore, am to study, is the deviations found in this type of contract. As part of this study the variations during different stages of contracts will be analysed and hopefully some common denominators for the problems leading to these deviations will be found.

The aim, or the goal of the thesis, is to identify possible common denominators leading to margin deviations through studying the contracts and interviewing key persons within the organisation. From the information gathered around the problem, one or several solutions for improving the processes around handling the contracts will be presented.

The studies conducted to identify possible problems or improvements to be made in the processes will be data quality/hygiene checks on a larger sample of agreements, further data quality checks on a smaller sample based on previous results and, finally more in-depth studies of a smaller sample of agreements found to deviate from originally sold margins. The deeper studies will be conducted through reviewing documents related to the agreement and qualitative interviews with Contract Managers responsible for the agreements studied.

Possible solutions or improvement suggestions will be made based on the theory and results of the studies.

1.3 Delimitations

Originally, the number of agreements available for me to study as part of this bachelor's thesis was 265 in total. This is, however, far too broad a scope to be able to study each agreement deeper, so a series of filters needed to be added to get a clear scope of which contracts to study. A basic quality check of the data in all 265 contracts was however done and will be presented as a different, smaller study. This smaller study also helped to further narrow down the pool of contracts to be studied and to check the data hygiene of the data imported into one certain margin.

For the scope of this study, it was determined to only include contracts signed after 1.1.2018. This due to some organisational changes and changes in ways of working due to the implementation of IFRS15 which makes contracts signed after this date comparable to each other, while older contracts might not be comparable in the same way. The result of limiting the number of contracts to those only signed after 1.1.2018, was a total of 104 contracts left.

To further focus the study, it was determined that only contracts with sufficient data would be included, which further limited the number of contracts in scope to 50.

Furthermore, of those contracts, only those which had a larger deviation than 1% from the original sales calculation were included. This left 40 contracts within the time limit, with enough data and margin deviations large enough to deem interesting for the scope of the study.

After this stage of delimitations, a separate smaller study was done, where the data of all contracts available in QlikView was quality checked. From this study, we then further decided on a total of 18 contracts that will be part of the deeper study.

The following factors were the starting point for the delimitation:

- Long-term service agreements for engine power plants
- Signed after 1.1.2018
- Margin deviation from initial sold margin larger than 1%
- Exclude agreements missing needed data
- Exclude contracts with a smaller deviation than 2% from manual checks done

1.3.1 Contracts within scope

After applying all conditions listed in chapter 1.2.1, 40 agreements were deemed suitable for further studies. This number of contracts was subject to further data quality and hygiene checks to ensure the validity of some figures. Of the 40 agreements, 18 of them were picked out for deeper studies, as that was deemed an appropriate amount to include in a bachelor's thesis. Therefore, I and my supervisor Jakob from Wärtsilä decided to include these in the scope of the deeper study.

1.3.2 Exceptions

Contracts outside of the scope of the main study mentioned in the previous chapters will also be investigated in some stages during the work of the bachelor's thesis. This is part of quality control of the figures imported to QlikView from the estimation software Estimo. The quality control is part of the thesis to ensure that the Sales Calculation column in QlikView is reliable. The number of contracts checked during this part is 264.

1.4 Structure

The thesis will be split up into different chapters, within which there will be subchapters going deeper into the details of the chapter. The main chapters of the thesis will be the following, with a short description of the contents after:

1. Introduction

- Information about the character and structure of the thesis, what parts it will contain, and the reason for the choice of the project.

2. Wäritsilä

- Information about the company available to the public.

3. Theory

- Theory of related subjects and explanation of the terminology used in the thesis

4. Method

- Information on how the study and thesis have been done and reasons why the techniques or ways of working have been chosen.

5. Results

- The results of the study are presented

6. Conclusions

- Conclusions and findings based on the results are presented

7. References

- Texts used as references are presented

8. Figures and appendices

- Materials used and produced during the work of the thesis are added as appendices

1.5 Confidentiality

Due to the nature of this study, all data studied as part of the thesis will be held in confidentiality. The version of the thesis presented here covers such information necessary to complete the study and present the results of the study, without disclosing sensitive information that will be held in confidentiality. These parts will be hidden and specified as confidential in this version and some parts are illustrated with randomized numbers with a disclaimer explaining how and why they are made.

2 Wärtsilä

This chapter will go over some basic facts about Wärtsilä as a company today including the company vision and goals, their history and the different businesses that make up the company.

2.1 History

The company's history began in 1834 in the form of a sawmill, in the village of Wärtsilä in the municipality of Tohmajärvi in the region of Karelia, Finland. The company grew steadily over time and went into other ventures such as ironworks during the 19th century. During the 20th century, Wärtsilä acquired several other companies and ventures, and as a result, came into new industries. During the year 1938, Wärtsilä Group Ltd was established. In 1959, Wärtsilä's first diesel engine with their own design was made, the 3- cylinder Wärtsilä Vasa 14. This engine was designed under the lead of a young civil engineer named Wilmer Wahlstedt, beginning in 1954. During the 20th century, Wärtsilä was involved in very many different business ventures. As time passed on, Wärtsilä started to focus more and more on the manufacturing, optimisation, and maintenance of engines and other related services. (Wärtsilä b, 2021)

2.2 Business segments

The company consists of five different segments, they are Energy, Marine Power, Marine Systems, Voyage and Portfolio Business. The first four constitute the reportable segments, while Portfolio business is reported as other business activities. As of the end of December 2020, Wärtsilä employed a total of 17792 people. Divided into the five segments according to Figure 1. (Wärtsilä a, 2021)

Segment	Number of employees
Marine Power	8 355
Marine systems	1 897
Voyage	1 915
Energy	4 888
Portfolio business	737

Figure 1, Employees per segment (Wärtsilä a, 2021)

2.3 Purpose and vision

Wärtsilä states that their purpose is to help enable sustainable societies through smart technology. The rise in need and demand for cleaner and more flexible energy solutions has been a driving factor in forming the vision within the Smart Energy and Marine visions. Wärtsilä has an ambition to continuously grow as a company, and this is enabled through a strong role in key international markets. Through the company's well integrated-portfolio, they can provide customers with energy-efficient and innovative solutions. The focus lies on improving and optimising performance in already existing engines, as well as producing newer solutions that provide the customer with a cleaner and more reliable source of energy. (Wärtsilä c, 2021)

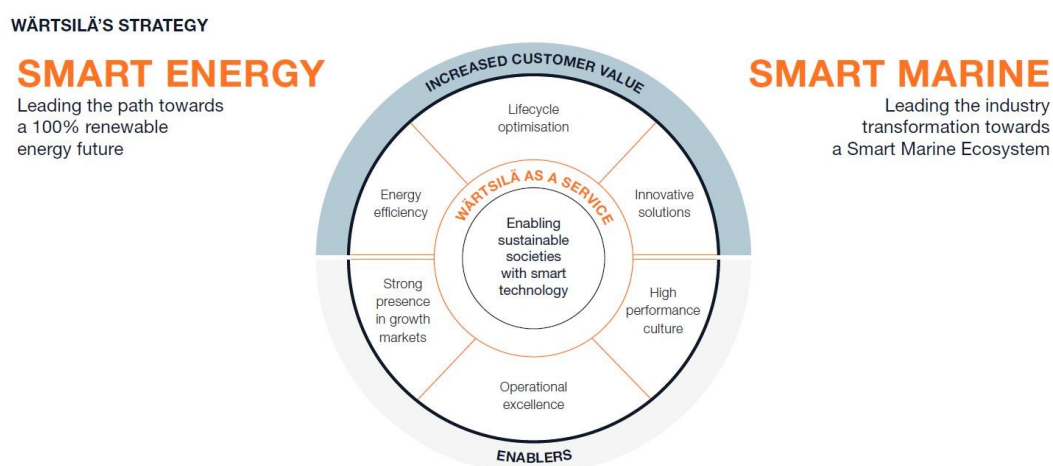


Figure 2, Wärtsilä's strategy (Wärtsilä c, 2021)

2.4 Wärtsilä Energy

Wärtsilä Energy is part of leading the world to a 100% renewable energy future. By helping customers with decarbonization through development of market-leading technologies. The company has a track record of 74 gigawatts in power plant capacity and more than 80 energy storage systems delivered to 180 countries around the globe. As every region of the world has different needs, Wärtsilä supports its customers by finding solutions fitting their needs. As part of the product portfolio of Wärtsilä Energy business, you can find Engine power plants, Hybrid power plants, energy storage and optimization, and lifecycle solutions. (Wärtsilä f, 2021)

2.5 Financial information

During the fiscal year 2020, Wärtsilä had Net sales of 4604 MEUR, and an operating profit of 234 MEUR. The largest group net sales came from Marine Power with 38.0% of sales, and second was Energy with 35.2%. The largest group net sales by market area was 34.1% in Asia, 33.5% in Europe and 23.4% in The Americas. (Wärtsilä d, 2021)

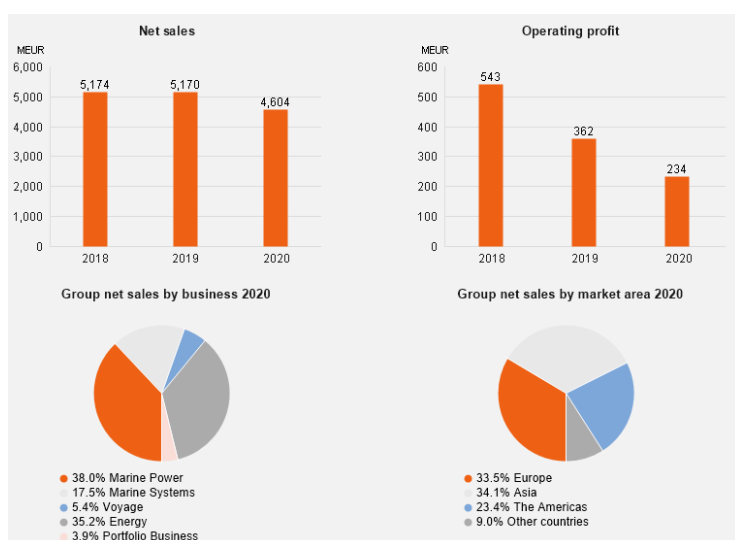


Figure 3, Net sales and operating profit illustrations (Wärtsilä c, 2021)

Wärtsilä stock is traded at the OMX Market under the Large Cap list by the stock symbol WRT1V. The currency it is traded in is Euro. The 3 largest major shareholders as of 28.02.2021 is Invaw invest AB holding 17,70%, Varma Mutual Pension Insurance Company holding 5,37% and Ilmarinen Mutual Pension Insurance Company holding 2,63% of the total publicly traded shares. As of 12.04.2021 the number of outstanding shares were 591.72 million, and the share price of WRT1V was 9.05 EUR as of 11/01/2021. During this time the market cap was 5,355.1 MEUR. (Wärtsilä d, 2021)

3 Theory

In this chapter, I will go through the theory behind my work, and definitions and/or explanations of some specific terminology used in the thesis. As the topic of the thesis is quite specific and unrelated to any clearly defined theory, subjects taken up will be things I have found as good support for parts of my thesis, but the work is not necessarily clearly based on any of the theory.

3.1 Software used and explanations

In the following part of the theory, the different software used in the study is presented and their functions explained. The definitions also act as an explanation for the reader who may not be familiar with the different names and helps with the understanding of the terms.

3.1.1 Estimo

Estimo is the financial planning tool for Agreement Management. The software is used internally within Wärtsilä to estimate, plan and follow up the financial events related to an agreement. The most central roles for Estimo within the stages of an agreements lifecycle I am studying are the financial mobilisation stage of an agreement and the tracking of activities and related costs and revenues during the lifetime of the contract. Sales Calc margin, published margin and current margin are all imported to QlikView from Estimo, since it is there where the margin percentages are generated while setting up and updating Estimo. (Wärtsilä e, 2021)



Figure 4, Estimo Logo (Wärtsilä e, 2021)

3.1.2 QlikView

QlikView, or QV for short, is an analytics software that can be used to gather and present information from a wide variety of sources. QV can be modified and interacted with while

using it to get overviews of activities and results within different categories. These categories can be things like geographical area and business area, so one can effectively keep track of changes and variations between businesses and trends in different regions. In my study the central role of QV has been to collect a dataset to start my work from together with agreement numbers with which I have been able to gather more detailed information from key people surrounding the agreements. (Qlik, 2021)

Within Wärtsilä the tool is used within Agreement management to review and analyse both Financial and Technical performance. (Wärtsilä e, 2021)

3.1.3 CMT

CMT is a tool used within Agreement Management, where main information about an agreement is gathered such as contractual dates (effective date, financial closing date, etc.), type of contract and information about the equipment included under the agreement. Using CMT you can get access to different types of reports about the performance of an agreement and other information related to the operation. (Wärtsilä e, 2021)

3.1.4 CRM

CRM is an abbreviation of Customer Relationship Management and is a tool (software) that is used to store information about interactions and relations with a customer or possible future customer opportunities. By using CRM as a tool within the business, a company can improve their overview of customer relations, and by doing that improve the streamlining of processes and profitability. Information stored in CRM also helps users in the company find key people to contact regarding needed actions related to an agreement or customer. This simplifies the communications within a company and reduces the time needed to find who to contact in both urgent and routine matters.

3.2 Margin deviation

As margin deviations are the focus of the main study, the following chapter will contain useful theory related to it.

3.2.1 Standard deviation

The starting point when studying deviations is to be aware of the term *standard deviation* which is in short, the expected variances in a sample of normally distributed values. The expected standard deviation is directly related to the sample size of n related to the size of the total population of N . For an example relating to my thesis, the total population or number of agreements, N , stands for the total number of agreements available to study while n is the sample size of the agreements studied. From this, the conclusion is that the more agreements I have studied, the smaller the standard deviation would be. Another great way standard deviation relates to deviations in margin is that the larger an agreement is in terms of scope of revenues and costs, the smaller the effect of one unexpected variation in cost is. In this example, N would be the total amount of calculated cost points and n would represent one or more of these individual cost points. The larger the scope of an agreement, the smaller the effect of one individual cost varying from the estimations. (Wikipedia, 2021)

3.2.2 Calculating margin for an agreement

According to John Care & Aron Bohlig, it is important to take your companies own gross profit margin goals into consideration when making a cost estimation and sale of a product or project. The company's total annual profit is after all a sum of the margins of all agreements and sales realized under the financial year. Due to this need of matching the margin of an agreement to the company's goals, one needs to figure out the budget of the customer and offer services according to their budget so that your company can make the necessary profits. (Care & Bohlig, 2014)

3.3 Contract risk

Larger companies naturally deal with large amounts of agreements, and with them comes detailed contracts/agreements. There are of course a basic set of rules and/or details of an agreement that will be identical between most agreements, but for each, there will most likely be some detail agreed upon with the customer during long negotiations. Each agreement carries with it a certain amount of risk, both for the customer and the company selling a product. Four common risks in an agreement and ways of avoiding or solving them

were defined by Ryan Newstead from the organisation PASA (Procurement and Supply Australasia) as the following:

1. Not meeting a goal or precedent set in the agreement
2. Missing a deadline or deliverables defined in the agreement
3. Missing a rollover or automatic continuation of an agreement
4. Inconsistencies in the treatment of agreements

The first one is quite an obvious risk, as larger agreements most often contain clauses about penalties and/or rewards if certain performance guarantees or such goals are not met. Missing important clauses in an agreement is best avoided by keeping rigorous checks and balances in the management of an agreement and can be by using these guarantee that nothing is missed by accident. If any other external factor affects the possibility of performing according to an agreement, it is important to have some type of insurances that covers the majority of possible financial damages to the company. (Newstead, 2017)

Number two on the list, missing a deadline or deliverables defined in the agreement is similar to the first, but can be harder to detect if it is a minor deadline loosely defined by the agreement. This can be avoided by using centralised date management tools to manage the account and dates defined in the agreement. By using such tools, you can assure that date, delivery or decision points are not missed. (Newstead, 2017)

Number three will not be taken up, since it is not usual for long-term service agreements to have an automatic rollover, but is instead renewed after an old agreement closes its end date if a continuation is expected. The fourth point, inconsistencies in documentation is a more important point from my perspective. It is of utmost importance that there is a clearly defined way of sorting and storing documents related to agreements, as it can otherwise result in confusion, delays, and problems within the performance of an agreement. This problem can be avoided with clear instructions and checking that all documents are in their intended places regularly. (Newstead, 2017)

3.4 International Financial Reporting Standard - IFRS 15

IFRS 15 is a financial reporting standard that an entity applies to their accounting practices, which is based on recognizing revenue by the rate at which the costs for an agreement have been recognized. This allows a company or entity to mitigate financial risks and allocate revenues over the lifetime of an agreement instead of entering the full amount of the agreement when it is sold. To recognise revenues under the standard, the company must identify the contracts and obligations under the contract with a customer. The prices of each transaction need to be determined and therefore recognised when a said exchange of goods or services takes place. The IFRS 15 standard was issued in May of 2014 and replaced IAS11, IAS18, IFRIC13, IFRIC18 and SIC-31 standards. It provided a more understandable and easier to use method for companies to recognise revenue from agreements. The standard has been effective from the first of January 2018. (IFRS, 2021)

As the use of IFRS 15 changed the ways of recognising revenue in Wärtsilä, the financial planning tool Estimo also changed characteristics and, the costs, as well as revenues, was processed differently after. For this reason, one natural cut-off point for the deeper studies of the thesis was the date 1.1.2018, as that was when IFRS 15 was effective from.

3.5 Data hygiene

Data hygiene is in short the practices surrounding ensuring that data is correct, unique and that all incorrect and duplicate data is classified as such correctly. Data can be considered hygienic if it is relatively clean. One can expect a certain amount of error in all data sets, but to be reliable, the vast majority of data must be reliable and up to date. Data hygiene is as such not only important to ensure that you have reliable data, but also to ensure that you are not keeping unnecessary irrelevant data. (Blanco, 2021)

The topic of data hygiene has come up in discussion during the preparations and execution of my bachelor's thesis work and is a central part of the data quality checks that have been performed. Data hygiene is one of the things needing to improve, to get a more realistic understanding of how the margins of an agreement evolves during its lifecycle.

4 Method

This chapter will present the different methods used in different stages of the thesis work. As there have been different tasks to complete as part of the work, these tasks have needed different strategies and ways of working to be completed efficiently. The details of the tasks and methods used for each task will be presented in the following chapters.

4.1 General planning and method of working

I began working on my thesis at the end of October 2020. The work started with receiving the subject from my supervisor at Wärtsilä, contacting Novia to get a supervisor from them and starting to draw the initial goals and scope of the thesis. Once we had an initial plan, I had a meeting with my supervisor from Novia, where I presented the subject and the scope of the thesis. The scope of the thesis was deemed sufficiently large for a bachelor’s thesis, and the next step was to have a meeting with both supervisors regarding the thesis. From that point on the work has been done independently by myself, with regular status updates and meetings with my supervisors to keep track of the progress and make sure I stayed within the scope of the study.

At the beginning of the process after the scope of the thesis was decided, I made a primitive version of a Gantt-chart in excel, so I would be able to track my progress and set out goals and deadlines for different tasks during the process. This chart has been continuously updated during the process since new necessary tasks not known in the beginning presented themselves during the process. The data gathering through interviews with Contract Managers took far longer than initially expected, which delayed the work process.

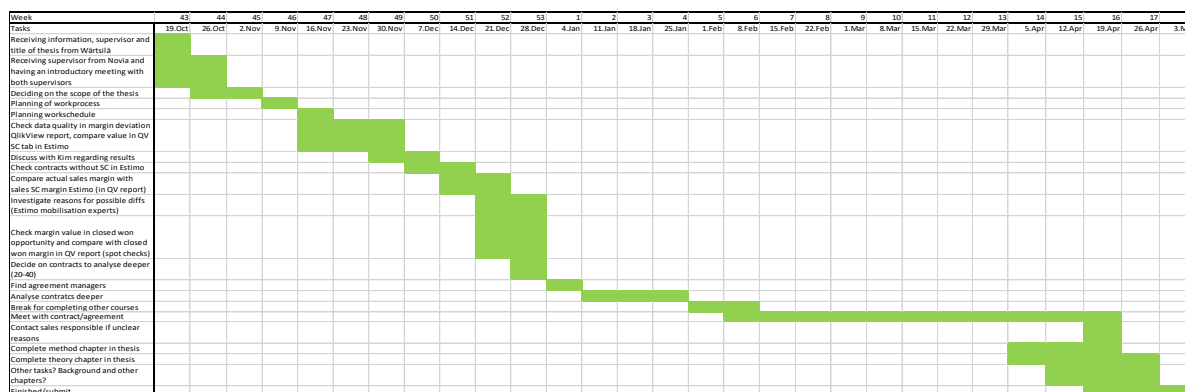


Figure 5, Planned work process and schedule

4.2 Data quality check

As part of the thesis, data imported to QlikView from Estimo has been reviewed by manually calculating the margin value from a tab in Estimo called Sales Calc, from where QlikView imports data to give one of the values called Sales Calculation margin. The two different categories of data check that has been done are **1)** Checking existing Sales Calculation margin with actual numbers in Estimo and **2)** Verifying if there is or isn't any data in the Sales Calc tab in Estimo.

4.2.1 Method for existing sales calculation margin

For the agreements with existing data in QlikView Sales Calculation Margin, of which there were a total of 141, the step-by-step method of gathering data regarding the quality of the imported numbers has been the following:

1. A list of agreements has been exported from QlikView to an Excel sheet
2. Agreements with and without data in the sales calculation margin tab is separated and sorted into separate lists
3. Figures from Estimo is gathered for each contract regarding total cost and revenue
4. A margin is calculated from the figures gathered
5. The margin manually calculated from figures in Estimo is compared to the value found in QlikView
6. Possible deviations between QlikView sales calculation margin and Estimo sales calc tab is noted and goes on to further analysis
7. Deviations are analysed and discussed with key people within the company working with data transfer from Estimo to QlikView.
8. Results and possible solutions are presented in chapter 5 and 6.

To check if the Sales Calc margin in QV matches the numbers in the Estimo Sales Calc tab, I needed to develop a way to gather all necessary data from Estimo, calculate the margin found there and finally compare that to what could be found in the values exported from QV into excel. To do this, I manually summed up all costs in one cell in excel and all costs in a different cell, and from these, I calculated the margin according to the following formula:

$$\text{Margin} = \frac{\text{Net Sales} - \text{Total costs}}{\text{Net Sales}} \quad (1)$$

From there on, I just subtracted the calculated margin from the margin value found in QV, and the possible diff was shown in the Difference column. If the result in that column was zero, there is no difference and the data is correct. Examples of how the work looked in excel are shown in **Figure 6**:

AgrCode	Contractname	Sales calc margin	Difference?	Estimo tab	Total costs	Net sales	Estimo margin account	Comment
AGR10000	Example Contract 1	15,00%	#DIV/0!	#DIV/0!				
AGR10001	Example Contract 2	20,00%	#DIV/0!	#DIV/0!				
AGR10002	Example Contract 3	15,00%	#DIV/0!	#DIV/0!				
AGR10003	Example Contract 4	20,00%	#DIV/0!	#DIV/0!				
AGR10004	Example Contract 5	30,00%	#DIV/0!	#DIV/0!				
AGR10005	Example Contract 6	5,00%	#DIV/0!	#DIV/0!				
AGR10006	Example Contract 7	16,00%	#DIV/0!	#DIV/0!				
AGR10007	Example Contract 8	14,00%	#DIV/0!	#DIV/0!				
AGR10008	Example Contract 9	16,00%	#DIV/0!	#DIV/0!				
AGR10009	Example Contract 10	9,00%	#DIV/0!	#DIV/0!				

Figure 6, Example of excel worksheet for data quality check for existing sales calculation margin

Note: The data used in the example has been randomly generated and does not correspond to any real agreements or numbers. It is only used to illustrate the method of working and margin percentages have been generated using the excel function =RANDBETWEEN (x, y) which gives the cell a random value between x and y. This is done to protect sensitive information which is only allowed to be used internally within Wäertsilä.

4.2.2 Method for non-existent sales calculation margin

For the agreements without existing data in QlikView Sales Calculation Margin, of which there were a total of 113, the step-by-step method of gathering data regarding the quality of the imported numbers has been the following:

1. A list is compiled for contracts without data in the sales calculation margin tab mentioned in step 2 in chapter 4.1.1.
2. Each agreement is checked in Estimo to see if there is any data in the sales calc tab.
3. If there is no data in the sales calc tab in Estimo, the data is correct and noted as such.
4. If there is data in the Estimo sales calc tab, the type of data is noted and further analysed.
5. Results of the check is presented and discussed with key people working with data transfer from Estimo to QlikView.
6. Results and possible solutions are presented in chapter 5 and 6.

AgrCode	Contractname	Sales calc margin	Difference?	Estimo tal	Total costs	Net sales	Estimo margin account	Comment
AGR10000	Example Contract 1	0,00%	#DIV/0!	#DIV/0!				
AGR10001	Example Contract 2	0,00%	#DIV/0!	#DIV/0!				
AGR10002	Example Contract 3	0,00%	#DIV/0!	#DIV/0!				
AGR10003	Example Contract 4	0,00%	#DIV/0!	#DIV/0!				
AGR10004	Example Contract 5	0,00%	#DIV/0!	#DIV/0!				
AGR10005	Example Contract 6	0,00%	#DIV/0!	#DIV/0!				
AGR10006	Example Contract 7	0,00%	#DIV/0!	#DIV/0!				
AGR10007	Example Contract 8	0,00%	#DIV/0!	#DIV/0!				
AGR10008	Example Contract 9	0,00%	#DIV/0!	#DIV/0!				
AGR10009	Example Contract 10	0,00%	#DIV/0!	#DIV/0!				

Figure 7, Example for no sales calc margin

Note: The data used in the example has been randomly generated and does not correspond to any real agreements or numbers. It is only used to illustrate the method of working. This is done to protect sensitive information which is only allowed to be used internally within Wärtsilä.

4.3 Discussions with Mobilisation Experts regarding findings

In this part of the thesis work, results from the data quality checks mentioned in result chapters 5.1.1 and 5.1.2 were presented and discussed with Contract mobilisation experts. Within Wärtsilä, there are two people working with Contract Mobilisation. One within Energy and one within Marine business. The contract mobilisation experts are still in contact and co-operation with each other while they have main responsibility of mobilisation within their own businesses. The results were presented and discussed, as well as things they saw that could affect the data quality checked. Further, improvement suggestions were discussed and developed during later stages in the work based on these discussions.

4.4 Method for main study

This subchapter contains the methodology used in the larger study and information of a **third** data quality check was done based on results of the data quality checked described in chapter 4.2.1, from where 40 agreements were chosen to be checked if there was matching data for the sold to margin between QV and CRM.

4.4.1 The process of delimitations

The main study was a deeper look into the margin deviations in several agreements determined by certain filters. The total number of agreements within the correct category was 265. Based on the research done in the data quality check mentioned in chapter 4.2, 142 agreements had sufficient data to begin a deeper analysis.

Further, we decided that the date 1.1.2018 would be a good cut-off point since Wärtsilä applied the IFRS 15 revenue recognition, which made agreements signed after that date comparable to each other due to the changed practices within revenue recognition and accounting. After this stage, there were a total of 104 agreements filling the criteria so far. The third filter used was for other types of data required to be able to compare figures, which left 50 agreements in the scope.

In the next stages, a comparison of margins from the original sold to margin with other margins was done. The first of these was a deviation larger than 2% from the original sold-to margin. Finally, 40 agreements were found to be interesting for the study, and after further data quality checks between data found in QV and CRM to be matching, the final 18 agreements chosen for the deeper study were selected. The final 18 agreements were picked out manually to narrow down the scope of the study to be able to gather necessary data and contact key persons within the company within a reasonable time frame.

4.4.2 Data quality check between QV and CRM

As mentioned in the delimitations chapter, a data quality check was done to ensure that the sold margin was correct in QV compared to what has been manually added in CRM by the time an agreement is signed and therefore marked as closed-won. The sold to margin in QV shows percentages with two decimals, for example, 12,34%, while the margin is shown without decimals in CRM, for example 12% instead of 12,34% in QV. A margin difference within $\pm 0,5\%$ is therefore considered accurate.

4.4.3 Finding key people and information for the final 18 agreements

A list of the final 18 agreements was compiled, and it was necessary to find key people within the company to contact regarding the margin deviations found in the agreements. Finding the contract/agreement managers (called CM after this point) was a logical solution

to this, as they are responsible for managing services provided within the agreement. They are also updating Estimo continuously with recognized costs and revenues during the lifetime of the agreements, so they are the people best able to give insight to what has affected the margin of an agreement. The CMs responsible for the agreements were identified through information found in CMT, which contains a list of people that has responsibilities or roles related to the agreements. The sales calculations were also found in most cases using CMT, which contains figures related to the margins which the sold agreement is based on.

A total of 14 CMs were found responsible for the 18 agreements within the scope of the study. This means that three of the CMs found manages more than one agreement. There were two CMs who individually manages two agreements each and one who manages three separate agreements.

4.4.4 Deciding on methods for data gathering

To be able to gather the data regarding the main 18 agreements, qualitative interviews were deemed a suitable method for receiving input from the CMs. For this purpose, an initial contact was done with the CMs to explain the purpose and goals of the study, and the CM could decide on whether they wanted to have a meeting where the questions were discussed and answered, or if they wanted to receive the questions via e-mail and answer there in text format. The questions were all related to the margins within the agreement and possible solutions and lessons learned as a result of the development of the agreement so far. The five questions asked to each CM were the following:

1. What were or are the largest reasons for the deviations in margin?
2. Have any actions been taken to counteract these?
3. When did the largest deviations occur?
4. Lessons learned/what could be done differently to avoid things like it in the future?
5. Was Estimo set up locally or using mobilisation experts?

4.4.5 Holding interviews and receiving information

Contract managers were to be contacted via email after decisions in chapter 4.4.4 were made. A template was developed, sharing the problem I was to study, and the purpose of

the study. Other than that, the CM was informed on which agreement I studied and needed input on. Further than that, the responses by CM were recorded and questions about if the CM prefers a meeting via Microsoft Teams, or if they prefer to answer the question in text format via email.

4.4.6 Processing of data received from interviews

The information received during the discussions and interviews with CM's has been collected and put together in a separate word document. All answers from the 14 CM's have been put together into separate chapters and looked through, and then possible common denominators have been looked at, and reasons possible to affect through my work has been processed further. The answers have in most cases included actions already taken to affect the margin deviation when they have occurred, and possible lessons learned which can be used to improve processes in the future.

4.5 Developing improvement suggestions based on study results

In this chapter, I will present the method and work process of developing improvement suggestions and implementation strategies for these.

The interviews and discussions used as a starting point to the improvements were the interviews with Contract Managers as well as mobilisation experts. Further ideas have come from the data quality checks done, where some issues were found relating to data hygiene and practices regarding the use of some software.

As is with many studies, one has to limit the number of things to include in the scope. Therefore, I decided to only focus on improvement suggestions or solutions which could lessen the impact of more than one of the agreements included in the deeper study. Furthermore, improvements in the data hygiene and figures shown in QV could also have a great impact on the ability to track the progress of an agreements margin. Unreliable numbers or simply outdated ways of importing data into QV only provides figures that don't reflect on what has happened in an agreement, it only serves to confuse or mislead the person looking at the figures.

5 Results

This chapter will process and present the results of the studies done in the thesis work. As there have been several separate studies done with different goals, the results for each study will be presented in different subchapters.

5.1 Results of data quality check

Here I will present the results found while checking the data quality of contracts mentioned in chapter 4.1. I will treat the two separate types of data I checked in two separate subchapters. For agreements with existing Sales Calc margin percentage, I will treat them in chapter 5.1.1 and agreements without Sales Calc percentages in subchapter 5.1.2.

5.1.1 Results for existing sales calculation margin

A total of 141 agreements were checked in this part of the quality check. Of the 141 a total of 76 agreements had matching data in QV and Estimo, which indicates the data transfer has been successful.

Four of 141 contracts showed positive values in the costs section while they should have been negative, as shown for Example Contract 4 in **Figure 8**. This resulted in the Margin Account in Estimo sales calc tab showing 180% when it, in reality, was 20%. When corrected to negative for costs, the check ended up matching what was shown in QV.

AgrCode	Contractname	Sales calc margin	Difference?	Estimo tab	Total costs	Net sales	Estimo margin account	Comment
AGR10000	Example Contract 1	15,00%	0,00%	15,00%	-105243	123815	15	
AGR10001	Example Contract 2	20,00%	0,00%	20,00%	-123295	154119	20	
AGR10002	Example Contract 3	15,00%	0,00%	15,00%	-67731	79684	15	
AGR10003	Example Contract 4	20,00%	0,00%	20,00%	-882	1103	180	Total costs positive
AGR10004	Example Contract 5	30,00%	0,00%	30,00%	-67992	97131		
AGR10005	Example Contract 6	5,00%	0,20%	4,80%	-94152	98897		
AGR10006	Example Contract 7	16,00%	4,46%	11,54%	-99244	112195		
AGR10007	Example Contract 8	14,00%	-7,38%	21,38%	-63957	81345		
AGR10008	Example Contract 9	16,00%	-4,16%	20,16%	-9598	12022		
AGR10009	Example Contract 10	9,00%	-9,47%	18,47%	-154983	190091		

Figure 8, Example for results with existing sales calculation margin

Note: The data used in the example has been randomly generated and do not correspond to any real agreements or numbers. It is only used to illustrate the results of the quality check This is done to protect sensitive information which is only allowed to be used internally within Wårtsilå.

5.1.2 Results for non-existing sales calculation margin

A total number of 123 contracts were checked in this part of the data quality check. These were all agreements found in QV without existing sales calculation margin (*margin tab=0*). The results of the check were that a total of 113 contracts did not have any data in the sales calc tab, eight contracts had data in the SC tab. Of these eight, seven only contained data in the cost accounts, which made a margin calculation impossible. 1 contract had identical cost and revenue accounts, which returned a margin of 0,00% in the calculations. 2 contracts only returned error messages while trying to access SC tab in Estimo, due to the engine accounts being moved to a new agreement. Below is an example of how the data quality check looked while doing the work. The reason for agreements having no data in the sales calc tab is most likely due to the changes made after IFRS 15 was implemented, as agreements before 1.1.2018 had different margin accounts in Estimo and therefore did not have any value to import from.

As seen in **Figure 9**, most of the agreements did not have any data in total costs or net sales accounts. Example contract 9 in the figure shows the results of a contract only having data in cost accounts, while agreement 10 shows the result of an agreement having identical cost and sales accounts.

AgrCode	Contractname	Sales calc margin	Difference?	Estimo tab	Total costs	Net sales	Estimo margin account	Comment
AGR10000	Example Contract 1	0,00%	#DIV/0!	#DIV/0!	0	0		
AGR10001	Example Contract 2	0,00%	#DIV/0!	#DIV/0!	0	0		
AGR10002	Example Contract 3	0,00%	#DIV/0!	#DIV/0!	0	0		
AGR10003	Example Contract 4	0,00%	#DIV/0!	#DIV/0!	0	0		
AGR10004	Example Contract 5	0,00%	#DIV/0!	#DIV/0!	0	0		
AGR10005	Example Contract 6	0,00%	#DIV/0!	#DIV/0!	0	0		
AGR10006	Example Contract 7	0,00%	#DIV/0!	#DIV/0!	0	0		
AGR10007	Example Contract 8	0,00%	#DIV/0!	#DIV/0!	0	0		
AGR10008	Example Contract 9	0,00%	#DIV/0!	#DIV/0!	-100000	0		
AGR10009	Example Contract 10	0,00%	0,00%	0,00%	-100000	100000		

Figure 9, Example for results with non-existing sales calculation margin

Note: The data used in the example has been randomly generated and does not correspond to any real agreements or numbers. It is only used to illustrate the results of the quality check This is done to protect sensitive information which is only allowed to be used internally within Wäertsilä.

5.1.3 Results of data quality check between QV and CRM

A total of 40 agreements were checked within the data quality check mentioned in method chapter 4.3.2. Of the 40 agreements checked, 39 had accurate numbers within $\pm 0,5\%$ compared between figures found in QV and CRM. One agreement was found to not match, but further research revealed that the agreement was not yet won and therefore not yet active. The Excel spreadsheet used to check the sold to margin in QV compared to what was found in CRM looked like the **Figure 10** presented below. The CRM column was marked green if the figures matched the sold to margin column within $\pm 0,5\%$ and was marked yellow if found not to be matching.

Agreement type	Agreementcode	Area	Contractual End	Effective Date	Signing Date	Sold to margin	CRM	
M	AGR10001	Middle	*****	*****	*****	23,09	23,00	
O&M	AGR10002	Americ	*****	*****	*****	26,59	27,00	
M	AGR10003	Europe	*****	*****	*****	19,81	20,00	
M	AGR10004	Europe	*****	*****	*****	12,76	13,00	
O&M	AGR10005	Middle	*****	*****	*****	13,63	14,00	
M	AGR10006	Middle	*****	*****	*****	18,47	18,00	
M	AGR10007	Europe	*****	*****	*****	18,75	19,00	
O&M	AGR10008	Middle	*****	*****	*****	9,98	10,00	
O&M	AGR10009	Middle	*****	*****	*****	17,28	17,00	
O&M	AGR10010	Americ	*****	*****	*****	22,28	22,00	
O&M	AGR10011	Middle	*****	*****	*****	24,66	25,00	
O&M	AGR10012	Europe	*****	*****	*****	15,28	15,00	
M	AGR10013	Americ	*****	*****	*****	13,80	14,00	
M	AGR10014	Americ	*****	*****	*****	16,37	16,00	
M	AGR10015	Middle	*****	*****	*****	28,90	29,00	
M	AGR10016	Middle	*****	*****	*****	29,83	30,00	
M	AGR10017	Europe	*****	*****	*****	6,37	6,00	
M	AGR10018	Middle	*****	*****	*****	25,64	26,00	
O&M	AGR10019	Middle	*****	*****	*****	16,25	16,00	
O&M	AGR10020	Middle	*****	*****	*****	24,38	24,00	
O&M	AGR10021	Americ	*****	*****	*****	13,79	14,00	
M	AGR10022	Middle	*****	*****	*****	6,71	7,00	
M	AGR10023	Middle	*****	*****	*****	14,59	15,00	
M	AGR10024	Middle	*****	*****	*****	18,14	18,00	
M	AGR10025	Americ	*****	*****	*****	15,08	15,00	
M	AGR10026	Americ	*****	*****	*****	8,56	9,00	
O&M	AGR10027	Americ	*****	*****	*****	8,37	8,00	
M	AGR10028	Middle	*****	*****	*****	15,67	16,00	
M	AGR10029	Americ	*****	*****	*****	20,44	20,00	
M	AGR10030	Europe	*****	*****	*****	10,52	11,00	
O&M	AGR10031	Americ	*****	*****	*****	28,71	29,00	
M	AGR10032	Americ	*****	*****	*****	22,01	22,00	
O&M	AGR10033	Middle	*****	*****	*****	12,94	13,00	
M	AGR10034	Americ	*****	*****	*****	23,89	24,00	
M	AGR10035	Middle	*****	*****	*****	5,14	5,00	
M	AGR10036	Europe	*****	*****	*****	24,57	23	*not yet cl
M	AGR10037	Europe	*****	*****	*****	20,03	20,00	
M	AGR10038	Europe	*****	*****	*****	19,97	20,00	
M	AGR10039	Middle	*****	*****	*****	19,76	20,00	
TMA	AGR10040	Europe	*****	*****	*****	9,68	10,00	

Figure 10, Results for data quality for sold to margin

Note: The data used in the example has been randomly generated and does not correspond to any real agreements or numbers. Where ***** is visible, the dates have been replaced with that, and all figures in the margin have been randomly generated using the function =randbetween(x,y)/100 in excel, where x the smallest number and y is the largest number returned by the function. It is only used to illustrate the results of the quality check This is done to protect sensitive information which is only allowed to be used internally within Wäertsilä.

5.2 Results of discussion with Mobilisation experts

In this chapter, I will present the results of discussions with mobilisation experts mentioned in chapter 4.3. The results discussed are the results from chapter 5.1.1 and 5.1.2.

Discussion regarding agreements with existing sales calc margin:

For agreements with existing Sales Calc margin some reasons for possible problems or deviation found was mentioned by the mobilisation experts.

The first thing mentioned by both experts was that the sales calc margin showed in QV is imported from the Sales Calc tab in Estimo, where the user needs to click a button that imports lifetime estimates after Estimo is set up. This step is necessary for QV to show the correct margin but is sometimes forgotten. A **solution** for this would be to make the import an automatic function done while publishing an agreement the first time. This would eliminate the risk of forgetting the import and would provide better data. Both mobilisation experts agreed that making the import an automatic function with the first publish would be a good solution to this problem. Regarding the agreements where the cost accounts showed positive numbers, the conclusion was that it is most likely some form of system failure or possibly a result of not importing the lifetime estimates.

Further improvements of the sales calc tab in Estimo would be a way to circumvent, or more easily identify, the issue of inaccurate sales calc margins being imported to QV from Estimo, would be to include the Total Act+Est summary from account view in the sales Calc tab in Estimo. Including the Total Act+Est summary in the Sales Calc tab and locking the figures at first publish would ensure that users would have a quicker way to check what the margin has been at the moment of first publish.

Discussion regarding agreements with non-existent sales calc margin:

For the agreements without sales calc margin, there were only the ones that contained data although the margin showed 0,00 in QV to discuss and the ones I was unable to access due to error messages. With the ones showing error messages, it was concluded that engine accounts had been moved to new agreements, and Estimo was, therefore, unable to show the accounts in the sales calc tab. For agreements with figures only in cost accounts or identical figures in sales and cost accounts, the most likely **reason** is forgetting to import from lifetime estimates when publishing for the first time.

5.3 Results for main study

In the following subchapter, the results of the main study will be presented.

The interviews were held according to the method chapter 4.4. There was a total of 18 agreements with 14 individual Contract Managers in total for the agreements. The result of the interviews were answers to the questions presented in chapter 4.2.1 and gave an insight into the perceived factors affecting the margin of their respective agreements. The fourteen interviews conducted including answers are listed in appendices 8.1 but is confidential and therefore not visible to external readers. By analysing the answers given by CMs, I was able to identify a few common denominators affecting margins. The term common denominator refers to reasons found in more than one agreement, which points to the fact that it is not an isolated incident and more leaning towards a problem or weaknesses in the processes related to cost estimation for an agreement. To be deemed of value for improving the process, the problems or weaknesses found need to be present in two or more agreements studied.

The common denominators found in two or more of the agreements studied, were the following (reason followed by number of agreements where the reason was found to be affecting current margins):

1. Issues related to incorrect or incomplete sales calculations: 9
2. Issues related to performance guarantees, or low generation during pandemic: 4
3. Issues related to incorrect use of Estimo: 2
4. Issues related to additional or changed charges from service centres: 2

Based on these common denominators, the most suitable problems to be solved, or improved, is number 1 and 3 from my perspective. All these common denominators will be used to form some improvement suggestions in the following chapter.

5.4 Improvement suggestions based on studies

In the following chapter the improvement suggestions with implementation strategies I have come up with as a result of the studies will be presented

5.4.1 First improvement suggestion: Improvement of calculations

The first improvement suggestion, and the most important one from my point of view, would be to improve the process of developing cost estimations for an agreement. Having accurate cost estimations as a starting point is vital for the ability to maintain an agreement sold margin.

The first step to be able to improve the accuracy of costs estimated would be to start a dialogue between parts of the organisation responsible for contract management and responsible people within cost estimation.

The second step as part of the solution would be to appoint and involve Contract Managers that will be responsible for an agreement if it is sold, and take their knowledge about the actual costs related to the maintenance of a particular engine. One great anecdote or example for the importance of this input was said during an interview I held with a contract manager, where in the cost estimation the spark plugs were estimated to need changing at a certain interval, while in reality, the spark plugs need changing twice as often. This great example shows how easily an incorrect value or automatic estimation from software can impact the margin radically, as the cost of only one type of component suddenly doubled compared to the estimations done in the sales stage.

The third step in the process of improving the process, would be to revise the services configurator to represent the needs of maintenance and spare parts more accurately for each engine profile.

Each of the three steps mentioned above would separately lower the risk of the margin in an agreement deviating from the original sold margin, but in combination, all three measures would have a greater impact and would serve to lower the deviations quite a bit.

5.4.2 Second improvement suggestion: Changing functions in Estimo

The second improvement suggestion would mainly focus on the tools used for tracking the development of the margins in an agreement. The focus lies on the sales calc tab and its functions. As was discovered in chapter 5.1.1, over half of the agreements did not have matching sales calc margins in QV and Estimo. One reason found to be a possible factor affecting this is the function to import from lifetime estimates, which is sometimes forgotten by users.

The issue of forgetting to do the import could be solved by automatization of the action if the lifetime estimates would automatically be imported when the agreement is published for the first time in Estimo. This would also simplify the process for mobilisation experts, as well as for users who are not as used to setting up agreements in Estimo, when it is done locally.

Another improvement suggestion would also be to rename the Sales Calc margin in QV, to something more like first publish. This would more accurately represent the margin in question, as the margin is calculated from the figures in the agreement at the moment when the agreement is first published in Estimo.

The third and final improvement suggestion for the function of the sales calc tab would be to include a snapshot of the Actuals and Estimates for the lifetime of the agreement from account view. This would provide a quick way for users to see how the costs, revenues, and margin has been affected since the agreement was published.

5.4.3 Third improvement suggestion: Standardisation of documentation

The third and final improvement suggestion that has come up as an idea as the result of my studies is the practices of documentation and sharing of documents within the company. A challenge I faced while gathering data for the main study, was the differing praxis found in storing documentation related to an agreement. There are certain places where one should be able to find documentation regarding an agreement, in my case that was in CMT. In CMT any user with access should be able to search for an agreement, and under the tabs People, they should be able to find key people within the agreement to contact if the information is needed, and under the M-files tab, they should be able to find links to documents relating to the agreement. The problem with this is that although the documents are mandatory to share via these tabs, they are in reality often either not shared or incorrectly shared. What I found during this information gathering was that many agreements lacked many or all documents that should be shared, and in some cases where links were shared, the user (in this case, me) could not access the correct documents via the M-Files link provided.

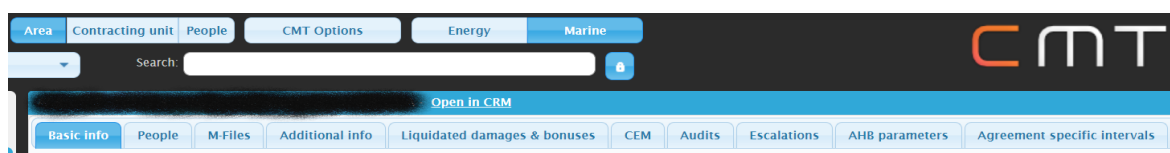


Figure 11, CMT agreement tabs

From my perspective, there are two main actions needed to improve the documentation and sharing of documentation related to an agreement. The first step would be to update the current instructions regarding the use of M-files tab in CMT to make it clearer for users responsible for sharing the links how to do it correctly. The links should take the user straight to the document in question for each row. In some cases, the same link was used for every document and redirected the user to a folder in M-Files. This makes finding documents harder to locate for the user who tries to find documents, as each document should have a unique link that directs the user straight to the correct document.

The second action needed to improve the documentation would be continuous work with checking that necessary links to documents are shared via CMT. Part of this would also be to remind responsible people about correct praxis regarding sharing of the files, so this would be a continuous work cycle of checking, reminding and so on until compliance is met.

6 Conclusions

The work of the thesis is now concluded, and it is time to look back and reflect on the work done and whether or not the results of the thesis matched the goals set at the beginning of the work process. Originally, the goals of the thesis were quite clear: to reach improvement suggestions or solutions to issues identified as affecting margin in an agreement or in the tools used to track the margins of an agreement. This goal was also fulfilled by the three improvement suggestions presented in chapter 5.4. The improvement suggestions were quite specific in some cases when it came to the Estimation software Estimo, and then quite broad when it comes to the process of sales and cost estimations. Improvement suggestions two and three would be easier to implement as it involves smaller parts of the company. However, the first improvement suggestion regarding the sales calculations and cost estimation would provide the most improvements in the process while also being the most complicated of the three to implement.

6.1 Work process

Looking back at the work process of the thesis, I can conclude that I might have prioritised the work stages a bit differently if I would have known what I know today. As is with many projects, it seems difficult in the beginning to correctly assume the tasks to be done during a project, as well as the time needed to complete those tasks. In this project, most of the tasks that needed to be done were clear in the beginning, which helped a lot with the planning. What I did not assess correctly, however, was the time needed to complete the steps of interviews and contact with contract managers. At the beginning of planning the work process, I assumed that this step would take about four to five weeks when it, in reality, took a total of 11 weeks to complete from first contact with the first manager to receiving input from the last one.

6.2 Method

The methods used in the thesis was as stated before a mix of manual data quality checks to assure that figures are accurate and qualitative interviews with key people in the company. I am satisfied with the methods chosen to conduct my work, as I think it gave a

good picture both of where some weaknesses are in the data quality/hygiene side as well as in the processes from the input I got from CM's. The original plan would have been to have more contact with sales also, but due to delays in the work some of these parts were left out, but could serve as a good start point for further studies.

6.3 Results

The results of the smaller studies, the data quality and hygiene checks, were quite clear. It proved that there are issues with the sales calc margin shown in QV, and it is necessary to make changes and improvements based on that. This was also quite expected, as the sales calc margin has been an issue in QV before the study, but it was a good step to get proof that there is an issue as a basis for further work. In the sold to margin, no issues were found, which is a positive thing as it is one of the most important values in tracking the development of an agreement's margin.

The results of the larger studies gave a good starting point for further improvement work, and gathering the input from several contract managers gave good insight to issues affecting margins from their perspective. Further communications with other parts of the company with insight to the happenings within an agreement would also have been preferable to get more reliable answers, but the information gathered at least a good indication of where issues come from and therefore a guide to where to begin further improvements to the processes.

6.4 Further studies and work

The result of the thesis was in the end only suggestions on what would need to improve in certain processes, and as such did not solve any direct problem other than identifying them and providing options for improvement. To further implement improvements in the tracking of margins in an agreement, further studies and practical work to change processes in the company is needed. The amount of work needed to implement the improvement suggestions could be a possible subject for a Masters level thesis, which is double the size or scope in expected work hours needed. This project would therefore be a good starting point for any employee in the company who is looking to continue studies after completing the Bachelor's level.

6.5 Thanks

I would like to end my bachelor's thesis with sincere thanks to both my supervisor's Jakob Asplund and Mikael Ehrs.

Jakob from Wärtsilä for giving me the opportunity to do the thesis for Wärtsilä and helping me throughout the work process and challenges, and Mikael for the guidance and support through the process of producing the thesis as well as his encouraging words along the way.

I would also like to thank the people within the company who has taken the time to discuss my findings and provide me with the necessary input to complete my thesis.

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8 Appendices

8.1 Interview with CM 1-14

Confidential

Comment: This appendice would contain a total of 15 pages with the interviews with the 14 contract managers regarding 18 separate agreements. It can be delivered as a separate document internally if requested, but can not be shared with the public due to its sensitive information.