TAMPERE POLYTECHNIC

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FINAL THESIS REPORT

MAITENANCE QUOTATION PROCESS REDESIGN OF WÄRTSILÄ FRANCE MARSEILLES

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ABSTRACT

The purpose of this research is to decrease Wärtsilä France Marseilles's response time for a demand of a maintenance quotation, for example a quotation for maintenance operation of 8000 running hours. To achieve this goal the maintenance quotation process was redesigned to be simpler, by removing manual work such as man hour estimation, search for information and manual calculation. This was done by creating a quotation tool with Microsoft Excel that integrated these functions.

The quotation tool was created for Wärtsilä Vasa 32 engine type, which is the most popular engine. Engine types could be later expanded. To remove the man hour estimation the measured maintenance operation times were converted to be applicable to the quotations. Services could be selected from the tool, which would calculate the total man hours. The calculation process for the quoted price was also included into the tool. The tool calculates automatically the quoted price when given the required information.

No key performance indicator were set to the project, so it is unknown if the process redesign has helped to decrease the response time. Most likely it wouldn't have made a great impact, because the tool was released for only one engine type. Other engine types' maintenance data would have to be included to have greater results.

Keywords: Service perspective, process redesign, quotation, maintenance, Wärtsilä

Abbreviations

EDI	Electronic Data Interchange
ERP	Enterprise Resource Planning
SCC	Service Cost Calculations
VBA	Visual Basic for Application

1. Introduction

1.1. Introduction to Wärtsilä

Wärtsilä is a Finnish power solution provider. It is the market leader in marine medium speed engines. It has a 45 percent market share in medium speed engines according to Wärtsilä's 4Q/2005 report for share holders (Ship Power Market … 2005). Marine engines and propulsion systems are Wärtsilä's core businesses. The company also provides power plant solutions for decentralized power generation market. Wärtsilä's engine, propulsion and power plant solutions are explained in chapter 1.1.2. Wärtsilä's headquarter is situated in Helsinki. The president and the CEO of the company is Ole Johansson and the chairman of the board is Antti Legerroos (Wärtsilä, Wikipedia).

Wärtsilä has become a key player in its field by numerous company accusations, such as Sultzer and Deutz's medium and large engine business. It has also heavily invested in after-sales services. Wärtsilä Services net sales in 2005 were 41 percent of the total net sales of 2,638.8 million euros. They provide service from 60 service stations situated worldwide. (Annual Report 2005)

1.1.1. History of Wärtsilä in brief

Wärtsilä was founded 1834 in Tohmäjärvi. Its history started from a sawmill. 20 years later the sawmill was converted to an iron mill. In 1938 Wärtsilä signed a license agreement for diesel engines with Friedrich Krupp Germania Werft AG. The first diesel engine was produced four years later in Wärtsilä's factory in Turku. In the late 70s Wärtsilä acquired 51 percent of Nohab's diesel engine business. In 1984 they acquired the rest of the shares. In 1989 they acquired SACM and Stork Werkspoor B.V and in 2000 they signed an alliance with John Crane-Lips. They could now provide complete propulsion and power solutions for marine industry. (Wärtsilä About Us, Wärtsilä)

1.1.2. Product range

Wärtsilä product segments are divided in ship power and power plant. The product range in ship power goes from multifuel engines to complete propulsion systems. The diesel engines power output ranges from 720kw up to 24 640kw per engine. Their main emphasis in diesel engine product range is two-stroke and four-stroke engines, but they also provide natural gas power

engines. The last two numbers in the product name specifies the engines cylinder bore size. For example, the Wärtsilä-Sultzer RTA-96C is the considered to be the biggest in production diesel engine in the world with a cylinder bore size of 96 cm (Wärtsilä-Sultzer RTA-96C, Wikipedia). The propulsion systems are sold under the brand name LIPS. They cover from control system to steerable thrusters to jets. The whole propulsion package is branded PROPAC. (Wärtsilä Product and Services, Wärtsilä)

For power plants Wärtsilä provides solutions from 1MW to 300MW. The range covers gas, oil or dual-fuel power plants. The dual-fuel engines can run with either oil or gas and the change of fuel type can be done on the run. (Wärtsilä Product and Services, Wärtsilä)

1.1.3. Wärtsilä France Marseilles

Wärtsilä Marseilles is located in the southern France in the commercial port of Marseilles. The office is right where the clients are. The office manager is Mr. Denis Pierchon. The office provides only after-sales services. Their service region is southern France from the border of Spain to the border of Italy. It is divided to an administrative part, a workshop and naval service. The office has around 50 employees depending of the service personnel. Two thirds of the employees are service personnel.

1.2. Research problems

The research problems are the un-efficiency of the quotation process and the great response time in a demand of a quotation. There were no measurable data of the un-efficiency of the process or the great response time, but it was estimated that the response time was from one day up to a week (Pierchon, 26.3.2006, interview). Because of the nature of this research where no previous data could be analyzed, action research method was selected as the research method. This research method allows conducting the research without having history data. Action research method is explained in the chapter 2.

As a solution to the research problems a quotation tool was created. The main objective of the tool is for creating a maintenance quotation for marine clients, for example a maintenance quotation of 8000 running hours for Wärtsilä Vasa 32 engine. The purpose of the quotation tool is to improve the response time for a demand of a quotation and to remove unnecessary paper work. Mr. Denis Pierchon, the manager of Wärtsilä Marseilles has had the idea for such a tool for a long time, but the lack of know-how has postponed the development (Pierchon and Degrassi, 10.2.2006, meeting).

2. Action research method

2.1. Definition of action research method

Action research method does not have a clear definition, since it is basically a way of approaching a research object, not a specific method. The method however has two main objectives. The first one is developing action and the second one influencing a problematic activity. It aims to develop practical activities, increase participants' ability to understand their actions and developing actual activity and situation. Nevertheless, without clear definition, all actions researches follow a similar path, which was introduced by Kemmis. He believes that action research method consists of cycles formed by planning, action, observation and reflection stages. The cycles are in a spiral and they keep continuing until the problem is solved. The processes are explained in depth later on. (P.Kyrö, Chapter 4)

Action research method provides a good tool to improve the company's operational efficiency if the group work is efficient. As action research seeks improvement and always attacks some kind of problem, it is widely used within companies. Commonly the companies are not even realizing that they are using action research method. One of the big benefits of action research is that it does not use research subjects' previous experiences but is interested in the present experiences. Action research is a flexible and adjustable, since it does not restrict or prevent changes in the research process.

2.2. History of action research

The origins of action research are a bit unclear. Many authors however refer in their papers that action research originated with Kurt Lewin. Lewin was an American social psychologist. He was the first one who used "action research" word in his work. The following features describe Lewin's action research: democracy, participation and simultaneous influence on both the development of science and the social change. It is been considered that Chris Argyris to be the most important developer of action research since Lewin. Ever since the 1940's Argyris and his research team have produced literature on the theory of action research. He has emphasized several different issues over the years. The most interesting ones are the publications on reflectivity of action and the development of learning and organization from the viewpoint of education. During the 1980's action research started to be one of the most popular used research methods in the field of education. In

Australia action research has had a significant influence on the development of education during the past few decades. Stephen Kemmis established an action research team in the University of Deakin, and the research conducted there has influenced enormously in the development of both the practice and the theory of action research. (P.Kyrö, Chapter 2)

2.3. Action research processes

Kemmis created a model for action research based on Lewin's work. The essential idea is that action and research stages take turns in a spiral process like in figure 2.1 (P.Kyrö, Chapter 6.1). Every individual action-research cycle consists of planning, action, observation and reflection. One action-research stage forms a foundation for the next one, and the objective is to constantly develop actions and their understanding. The spiral is an ongoing process until to the point that the research is completed. Everything is closely linked together and the process evolves during their implantation.

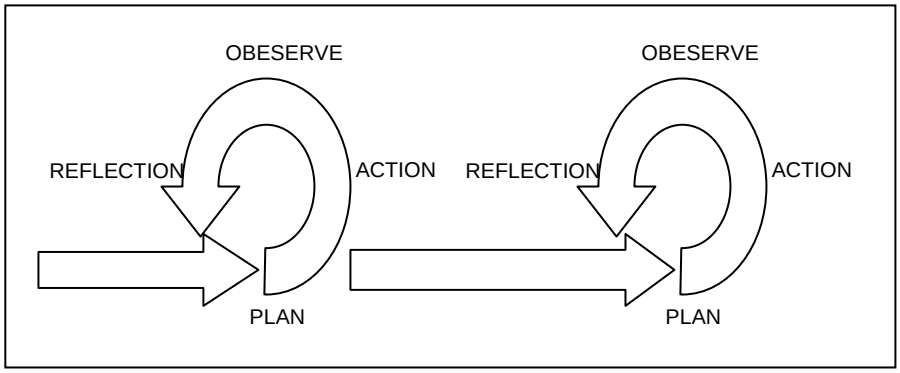


Figure 2.1 Action research method process spiral

2.3.1. Planning

In the planning stage a researcher orientates in the studied activity together with the participants. While specifying the plan, one needs to consider the theoretical starting points of the development project. The action plan specifies also the objectives of a study. In wide-ranged action researches it is good to express also the objectives of the first action cycle along with the objectives that are set for the longer period of time. During the planning stage one should also determine the division of work into a form, in which everyone's expertise and knowledge can be utilized as well as possible. (P. Kyrö, chapter 6.2)

2.3.2. Action

An action stage follows the objectives and the designed plan, as far as it is possible. The purpose of an action is to find new solutions and to reach experimental nature and flexibility, in which one of the most important features is co-operation. However, the nature of action research includes the fact that a plan can be changed during the action, if the received feedback requires that, since several issues may have changed already at the beginning of an activity. (P. Kyrö, chapter 6.2)

2.3.3. Observation

Planned observation is the stage of action research that most clearly distinguishes it from practical work. Data is being gathered for further analysis and reflection through observation. The researcher needs to be practical and decide from which stages it is relevant to collect data. There are so many things happening in natural surroundings that it is not possible, or even necessary, to document everything accurately. (P. Kyrö, chapter 6.2)

2.3.4. Reflection

A researcher’s task is to analyze and interpret the gathered data. Reflection is used in finding out how an action research has managed to develop both the studied object and the participants themselves. After reflection a new plan is created on the future development of an object. The reflection stage of an action research is essential when evaluating the quality of an action research. (P. Kyrö, chapter 6.2)

3. Service perspective

3.1. Definition of service

Payne defines the services as follows “a service is an activity which has some element of intangibility associated with it, which involves some interaction with customer of with property in their possession, and does not result in a transfer of ownership. A change in condition may occur and production of the service may or may not be closely associated with psychical good”. The definition of the services can be continued to its characteristics. Services are usually abstract and intangible. They are non-standard and highly variable and they can not be stored in an inventory. (Payne,1993:7)

3.2. The importance of service perspective

Many companies have not yet benefited the full potential of services. By services it is referred in this case to services that are provided with physical goods, such as maintenance services that Wärtsilä provides. The importance of services can be seen also in figures. In the case of Wärtsilä, services make up to over 40 percent of the total net sales (Annual Report 2005). So the importance of services should not be neglected.

According to Grönroos the additional services can differentiate the company from its competitors (C. Grönroos, 200:4). It has to be kept in mind that services provide additional value to the products and that additional value might make the difference if the core product quality and price are the same as the competitors. The customers are not looking for only the physical product, but they are looking for a solution to their need. The customers evaluate the company by the value of services, products, people and image (Payne, 1993:96), so for example Wärtsilä’s customers are not looking for an engine, but they are looking for a power solution for their vessel which includes an engine and maintenance services.

It also easier for the companies to outperform its competitors using service perspective than using the other perspectives according to Grönroos, because the company is adding value to the provided solution (C. Grönroos, 200:4). The other possible perspectives are explained the next chapters to come. Grönroos continues that it easier to establish a relationship to the customer if the customer feels like that company can offer something special and valuable. For example Wärtsilä doesn’t compete with prices in the vessels’ engine maintenance market. There are cheaper companies such

SudMotors that provide the same type of maintenance with lower prices, but these companies doesn't have the expertise as high as Wärtsilä and they don't provide genuine Wärtsilä spare parts every time (Pierchon, 30.3.2006, interview).

Grönroos explains that companies often might look that they are practicing the service perspective, because they provide good billable services. Billable services are types of services that can easily be invoiced and calculated in their turnovers. These companies do not recognize non-billable services as a part of customer's value-creating process. Non-billable services or so called hidden-services are for example complaint management, invoicing accuracy, quotation response time, additional documentation service and query handling. They are also vital areas how the customer perceives the company, so they can there fore provide additional value. Any ignoration of the hidden-services might severely damage the relationship for example the customer might feel that he is not important if it takes several days to receive a quotation or an answer to a query. (C. Grönroos, 2000:3)

Payne states that the quality of the service is an important factor in service perspective (A. Payne, 1993:96). By maintaining a high quality service is a good strategy in long-run, because this allows the customer to be loyal to the provider of the service. M. Futrell explains that perceived service satisfaction is the differences of the expected and actual service (figure 3.1). The less there are differences increases the customers satisfaction which eventually leads to repeat order. The repeat orders tend to achieve customer retention. These types of customers are loyal to the company that provide the service and are hard to be convinced to buy from the competitor. (M.Futrell,1999:404)

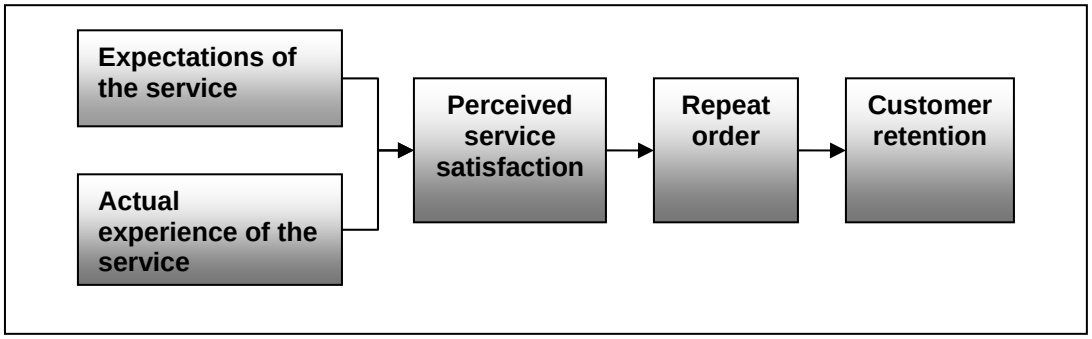


Figure 3.1 Customer retention in service

3.3. Core product perspective

Grönroos defines core product perspective as traditional scientific management-based approach. The main competitive advantage is considered to be the quality of core solution. The companies that have technological advantage usually carry this perspective. The value given to the customer is the technological advantage of the core solution. Companies usually do provide service, but they are not thought as strategic and the qualities of the hidden-services are not emphasized. (C. Grönroos, 2000:7) The problems with core product perspective are that once the technological advantage is lost or the core solution doesn't distinguish enough, the company is forced to lower its prices to persuade the customer to buy. This is not a sustainable strategy in long run. Lowering the prices might lead to a circle of price reduction, where the price has to be lowered again and again.

3.4. Price perspective

If a company conducts the price perspective policy, they consider low prices as their main advantage to the competitors. If the company can achieve and maintain cost advantages to the competitors and still be able invest in the development, this might be the right perspective. (C. Grönroos, 2000:7) Problems arises when the competitors lower their prices, because then the company needs to lower its price to maintain its advantage. That means that the profit margin will also decrease so the investments in development have to be cut and this might eventually end up in a situation where the company doesn't develop anymore.

3.5. Image perspective

In image perspective the company creates its advantage by creating a brand around its core solutions. Typical industries that use this perspective are fashion, food and fast-food restaurants industries. For some of the companies this type perspective has been effective according to Grönroos. (C. Grönroos, 2000:7) In this type of perspective the companies invests heavily in marketing communication. The advantage is created by marketing and advertising. The weakness of the perspective is that the core solution is as strong as the strength of the brand. Any event that decreases the brand value will therefore decrease the value of the core solution. Events like that could be an increase in competitor's brand or a scandal such the documentary movie "Super-sized me" by Morgan Spurlock against McDonald's (M. Spurlock, 2004).

4. Organizational buyer behavior

The following chapters examine the decision-making processes of consumers and organizations. The emphasis is more in the process of organizations since Wärtsilä's customers are mainly organizations.

4.1. The difference of organizational and consumer buying behavior

One of the biggest difference between organizational and consumer buyers is the quantity of buyers. There are a lot less buyers in business to business than in business to consumer. This leads to that the relationships are more important in business to business according to Jobber and Lancaster (D. Jobber and G. Lancaster, 2003:64). The quantity of buyers in business to business leads also to that the selling is more risky. A loss of a deal in business to business will have a greater impact than a single consumer will decide not to buy the solution. Jobber and Lancaster continue that the organization's buying criteria is more rational. The decisions are based on economic criteria, because the decision has to be justified to others in the organization and the easiest method is to prove that the purchased solution will reduce costs in some area or increase productivity in example. The organizations are also more demanding. They usually have specific requirements and that leads up to that the solution has to be altered and customized to the need. The buying process in business to business is also more complex, because the price of the purchase is usually far greater than in consumer transactions so many people have to be involved in the decision-making process within different levels of the organization, for example production managers, purchasing managers and managing directors. Because of the whole complexity of high price and specific requirements, the deals are almost always negotiated. For example in maintenance cases in Wärtsilä the negotiation might last from couple of days up to a week.(Degrassi, 10.2.2006, interview).

4.2. Consumer decision-making process

According to Jobber and Lancaster the decision-making process starts from a need (Figure 4.1)(D. Jobber and G. Lancaster, 2003:67). The need may arise from natural process of life or stimulation. An example of a need that arises from natural process of life could be that the television breaks down and it has to be replaced. Stimulated needs arise from advertisements.

In the next phase the consumer gathers information of possible solutions to fulfill the need. In this phase the consumer searches and charts for example different televisions.

After the background information is found, the consumer starts to evaluate the alternatives to find the best possible solution. The evaluation is divided in four groups: evaluative criteria, beliefs, attitudes, intentions. Evaluative criteria are the variables that the consumer compare and evaluate the solution, for example how big is the television (D. Jobber and G. Lancaster, 2003:68). Beliefs are how the consumer views the solution or the brand, for example that he might thinks that Sony is a good brand. Attitudes reflect the linking or the disliking of the solution, for example that the television is only 28 inches. Intension means how seriously the consumer is to buy the solution. After the evaluation is done, the consumer selects his solution and purchases it, if the decision came to that.

The process doesn't end at a purchase but continues to post-purchase evaluation where the consumer evaluates what was been purchased. If the solution fulfilled the need and the consumer is satisfied, it increases the beliefs to the brand, company and product. This might lead that the consumer purchases the next solution from the same company.

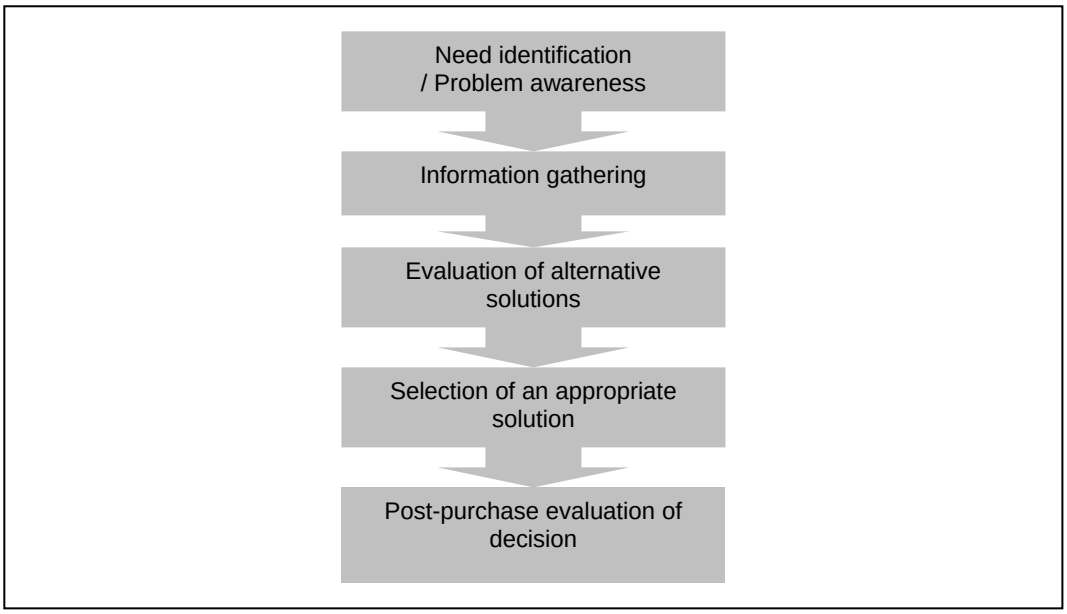


Figure 4.1 Consumer decision-making process (Jobber and Lancaster 2003:67)

4.3. Organizational decision-making process

It is important to be aware that the decision-making process is much more complex in an organization. Consumers usually have the power to do the process alone from need identification to the actual purchase. This is rarely the case in an organization. Every step in the process might be handled by a different person or persons. The different persons can be categorized in six groups: buyer, decider, influencer, user, initiator and gatekeeper. The buyer is the responsible for dealing. It is the buyer who places the orders. The decider is the person who has the power to make the final decision. The decider can be for example CEO's of the company. The influencers are person who determine the characteristics. These persons are usually engineers or product managers. The users are persons who actually use the solution. The initiator is the person who discovered the need for the solution. The gatekeepers are the persons who control the information flow for example administrative assistants. The different steps in organizational decision-making process (figure 4.2) are explained in detail in the following chapters. (Principles of Marketing: part 4 : 6)

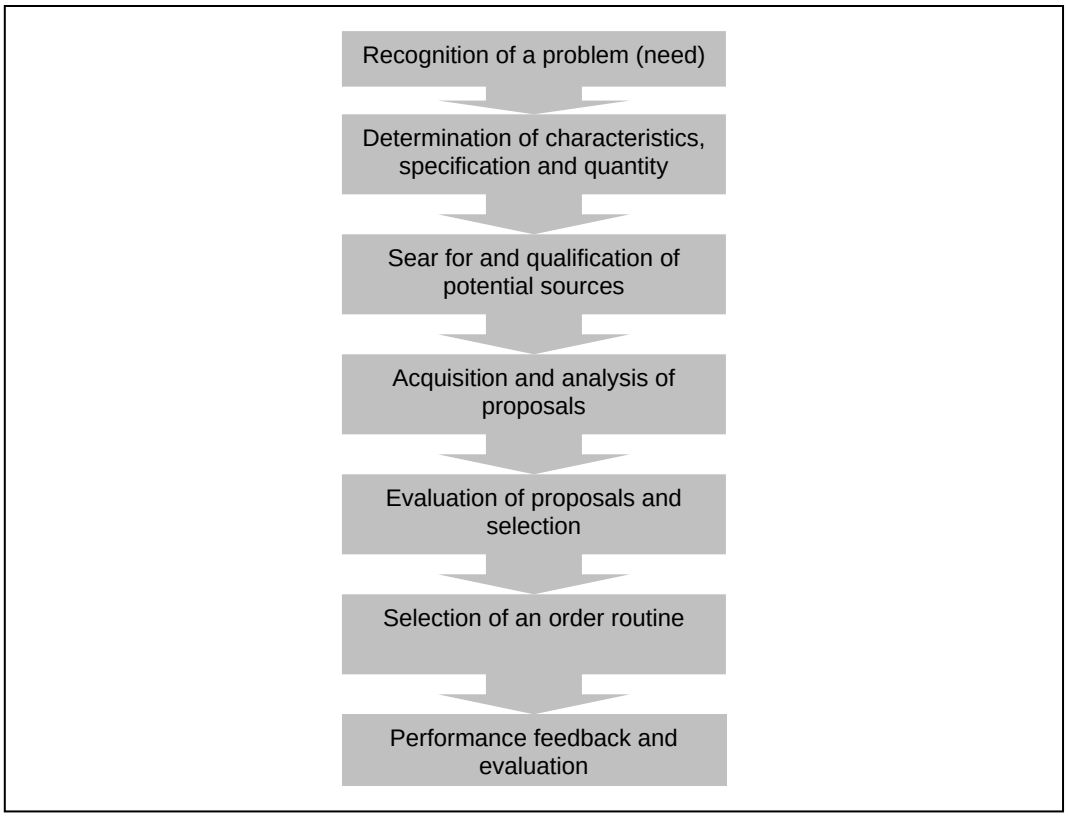


Figure 4.2 Organizational decision-making process (Jobber and Lancaster 2003:79)

4.3.1. Need/Problem recognition

The recognition of a need or of a problem can be classified according to Jobber and Lancaster in to three categories: external, internal active and internal passive (D. Jobber and G. Lancaster, 2003:80). External stimulations are those that come from outside the organization. For example a manager can be completely satisfied with the current solution until the manager is being made aware that there is a better solution available. By internal active is referred to situation where the need is comes inside the company for example an engine needs maintenance. The active refers to that the maintenance need is being acted on. In internal passive the need also raises from inside the organization as in internal active, but in internal passive there is no action to execute the need. The reason to this might be that there are more important manners that have to be handled before.

4.3.2. Determination of characteristics, specifications and quantity

Next step the buyer does after the need is recognized is to draw up the characteristics, specifications and of course the quantity (D. Jobber and G. Lancaster, 2003:80). The quantity in my case is not a crucial factor since the maintenance is to one power solution. In the other hand specifications are extremely important since it is rarely the case that the buyer wants to follow the entire maintenance schedule. So the maintenance has to be tailored to the need.

4.3.3. Search for and qualification of potential sources

After the characteristics, specifications and the quantity have been determined, the organization starts to search different solution providers. The amount of time that is put in this process depends greatly in the importance of the matter. More the need is import more time is taken to find suppliers that can provide the solution and vice versa. In this process the organizations do not ask yet for a quotation, but process can be characterized as finding background information. (D. Jobber and G. Lancaster, 2003:80)

4.3.4. Acquisition and analysis of proposals

Now when the different solution providers have been charted, the organization selects the ones whom to ask for a quotation. Reputation and technical expertise play an import part in the selection of the solution providers whom the quotation is asked according to Jobber and Lancaster.

Every proposal and quotation is heavily analyzed. The quotations are negotiated to the level that they meet the characteristics and specifications set by the organization. This can be a long process. The time taken in this process also varies on the importance of the need. (D. Jobber and G. Lancaster, 2003:80)

4.3.5. Evaluation of proposals and selection of suppliers

When all the quotations have been analyzed the organization starts to evaluate them. The evaluation criteria differ from person to person and organization to organization. The different criteria can be seen in table 4.3.The goal of this process is to select the solution provider. (D. Jobber and G. Lancaster, 2003:81)

Economic	Emotional
Price	Prestige
Delivery	Personal risk reduction
Productivity - cost versus revenues	Office politics
Life-cycle costs	Quiet life
Reliability	Pleasure
Durability	Reciprocity
Upgradeability	Confidence
Technical assistance	Convenience
Commercial assistance	
Safety	

Table 4.3 Choice criteria (Jobber and Lancaster 2003:81)

4.3.6. Selection of an order routine

In this process the details of payment and delivery are drawn up. This process is commonly integrated in the two previous processes (see 4.3.4 and 4.3.5) since payment and delivery terms are usually also considered as an important factor when choosing the solution provider. (D. Jobber and G. Lancaster, 2003:81)

4.3.7. Performance feedback and evaluation

Performance feedback and evaluation is the last step in organizational decision-making process. This might be formal event where the solution is evaluated (D. Jobber and G. Lancaster, 2003:81). Since this is an after purchase process it not always done.

5. Information systems

5.1. Definition

Zwass defines an information system as an organized set of components for collecting, transmitting, storing and processing data in order to deliver information for an action. (V. Zwass, 1998:5)

5.2. The purpose of information systems

The information system has two great purposes. The first is to helps us do decisions by collecting and processing data. The aid in the decision-making can be the generated reports or simply the knowledge of inventory level to help us re-order goods. The second big purpose is to automate processes. An example of automating a process is invoicing, where invoices used to be sent manually is now days possible to send them automatically by the system. (V. Zwass, 1998:6)

5.3. Different types of information systems

The figure 5.1 shows the different information systems in an organization according to Zwass. The triangle inside the figure represents the hierarchy of an organization.

Interorganizational systems are systems that are connected to other organizations. These systems are typically connected by the EDI standard (V. Zwass, 1998:8). EDI is a standard that allows different information systems such as ERP systems to communicate with each other (Electronical… Wikipedia). Interorganizational systems can be for example invoicing or automated purchasing.

Office information systems support and help coordinate knowledge work. The coordinated information can be text, data, image or even voice. (V. Zwass, 1998:8)

Professional support systems are supporting systems to a specific task for a specific profession (V. Zwass, 1998:8). These systems can for example an item specification system for a purchaser to get the specifications of any purchased item.

Transaction processing systems are for operational data processing (V. Zwass, 1998:8). Examples of such systems could be order registration or a system that produces payroll checks.

Management reporting systems are for generating reports at specific time intervals to help the manager to control own area of responsibility (V. Zwass, 1998:8). These reports can be from staff work hours to order delivery performance.

Decision support systems are designed to help in either individual or collective decision making (V. Zwass, 1998:8). These generated reports can be for example budgeting or sales forecast reports.

Executive information systems are for senior executives or board members. These systems generate reports for long-term and strategic decision making (V. Zwass, 1998:8). Reports can be summarized organization data.

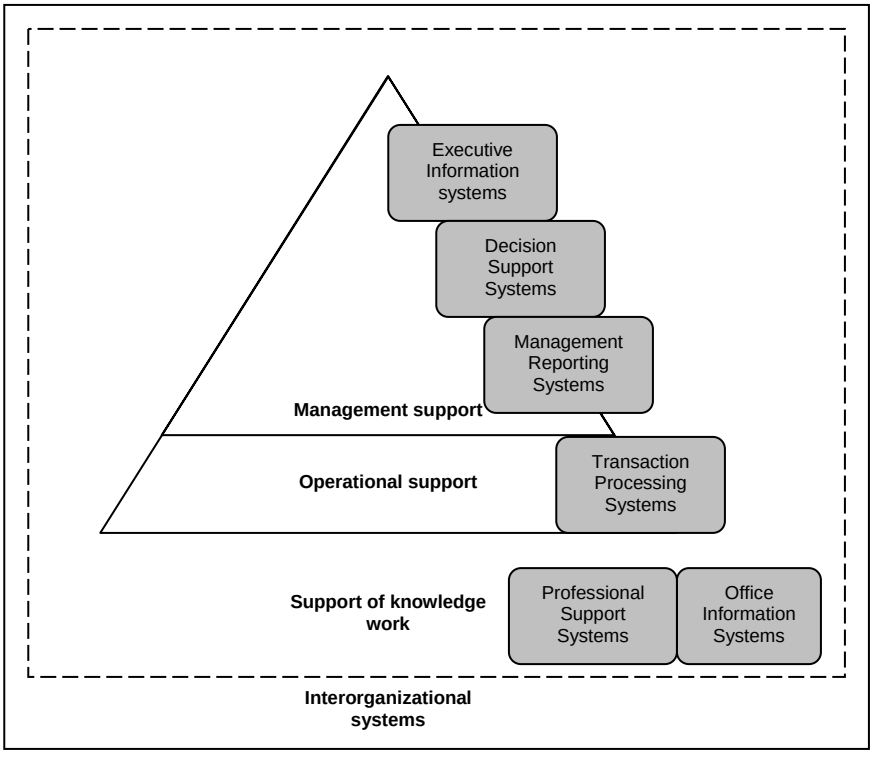


Figure 5.1 Information systems in organization (V. Zwass:1998:8)

5.4. Business process redesign

Even though information systems have existed for a long time, they still aren't used at their full capacity to enhance business processes. A lot of time is still wasted in organization by copying data manually from on place to another, like in this case the account managers had to copy the different service specifications from the paper to the quotation which is done with the computer.

Business process redesigns tries to streamline that is to simplify, optimize and enhance the process (V. Zwass, 1998:27). The goal isn't to reinvent the process. If the process is reinvented it is called business re-engineering. The capabilities and the benefits of business process redesign are stated in figure 5.2. For example the capabilities of the quotation tool are fast and accurate data processing and instantaneous access to information. The new process allows an increase in the variety of services and automates it. As result it increases dramatically the respond time and that way enhances the competitive position. How the tool enables these advantages are explained in the later chapters.

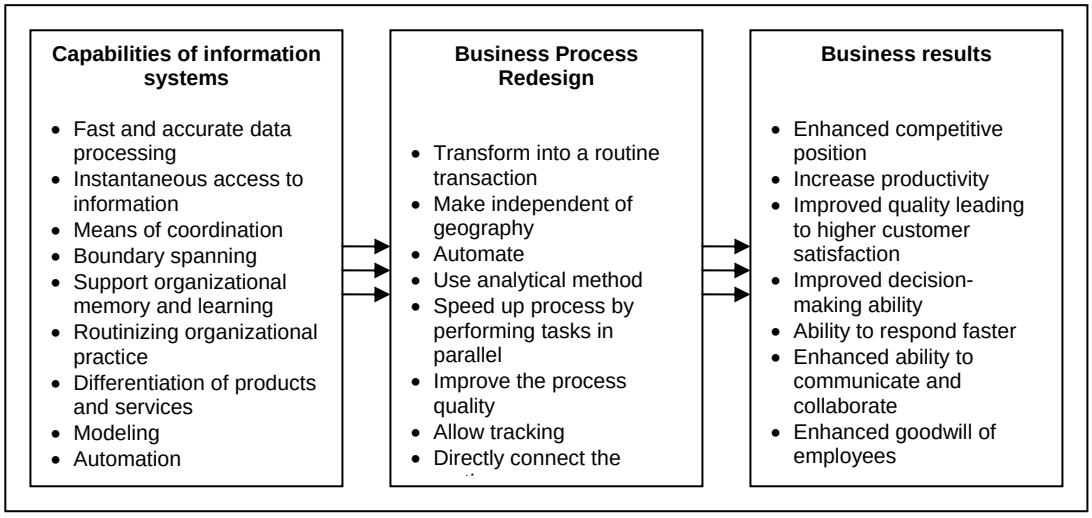


Figure 5.2 Business redesign capabilities and benefits (V. Zwass, 1998:28)

6. Quotation process redesign

The main goal of the tool was to improve the quotation response time (figure 6.1). As stated in chapter 3.2 the time taken to receive a quotation might be an important factor in the decision making process of a client. The faster the quotation is sent, the faster the negotiations can start. Before the response time for a demand of a quotation was from one to week days (Pierchon, 26.3.2006, interview). The response time is an estimate, because the response times have not been measured. The long response was due the lack of proper information and manual work. The service information had to be gathered from different maintenance catalogues.

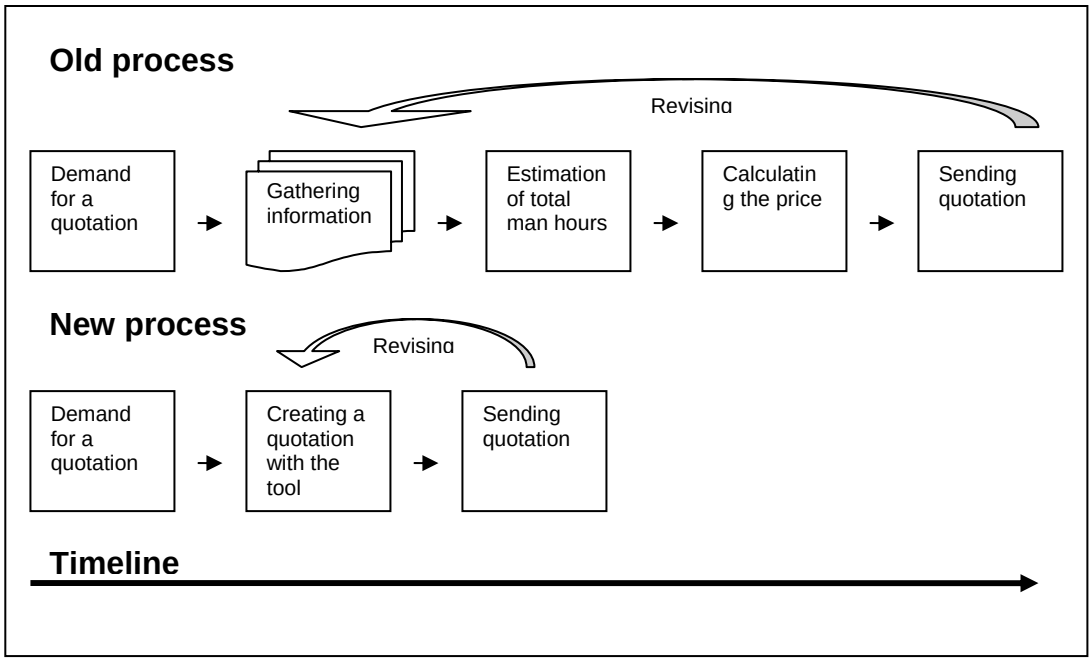


Figure 6.1 Old process and new process

The total man hours had to be estimated with personnel knowledge, because the information from the catalogues and the history records of previous maintenance operation weren't comparable. The compatibility problem was because the history records were more detailed and weren't classified in the same format as the information in the catalogues. These two types of information were linked together. Only this operation would reduce the response time significantly.

The other big change to streamline the process was to standardize the calculation method for calculating the price. Previously every account manager had their own way how the final price was calculated. The tool would harmonize and standardize how the quoted price would be calculated.

In most of the cases the quotation had to be revised due the specific needs of the client. This was a time consuming process since it would require more man hour estimation and recalculation of the entire quotation. The tool allows creating a new revision of the quotation only by couple clicks by selecting or deselecting the services to meet the specific demand.

In the first phase of the process redesign the tool is created for the most popular engine Wärtsilä Vasa 32. One engine type was selected, because of the time limit and because to see if the new process would work. It would be then possible to expand to other engine types.

With these actions the quotation process was redesigned to be simpler. It was estimated that the quotation response time will drop to couple of hours or maximum a day (Pierchon and Degrassi, 24.5.2006, meeting).

6.1. Feasibility study for creating the tool

It was important before the creation of the tool could start was to know how other Wärtsilä after sales offices created their quotations. A small survey was conducted in the second week of February. This was done to avoid creating a tool that already might exist. Four Wärtsilä after sales offices were contacted: Wärtsilä Spain, Wärtsilä Italy, Wärtsilä Netherlands and Wärtsilä Greece. All the contacted offices had the same old business process as Wärtsilä Marseilles which required a lot manual work. Wärtsilä Spain and Italy used Service Cost Calculations (SCC) software as an aid for creating the quotation. SCC is a software for calculating total maintenance costs in the long-run and thus isn't applicable for creating service quotation. After the small survey the creation of the quotation tool started, because none of the offices had a tool like it.

6.2. Choice of software for creating the tool

One of the criteria of the software was that it shouldn't add any supplementary costs so this limited the choice to the software that Wärtsilä Marseilles already had acquired or to freeware (Pierchon and Degrassi, 10.2.2006, meeting). What was wanted from the tool was that it should be easy to transfer and it should be possible to use it offline. The quotations should be possible to do without an internet connection. This is because the

quotations had to be created or revised for example onboard vessels where no internet connection is available. The information has a lot of database types of characteristics such as the service list, but the need to create the quotations offline ruled out database software such as MySQL, because these types of software tend to require an internet connection.

The need that the tool should be easily transferable narrowed the choice to Microsoft Excel or to Microsoft Access. These two software were the software which I had the most experience. Since the tool would require many calculation operations, the choice came to Microsoft Excel 2003. The calculation operations could be programmed more easily with Microsoft Excel than Microsoft Access. Also no one at office had any previous experience of Microsoft Access and if the decision had been Access it would had required personnel training. Microsoft Excel was also widely used in the office so it would be easier for the users to familiarize with the tool.

Microsoft Excel also provides a good and easy programming environment. VBA is an embedded programming environment in Microsoft Office products. With VBA it is possible to extent the functionalities of Microsoft Office products such as Excel (Visual Basic for Applications… Microsoft). Most of the tools functionalities are created with VBA, because it is not possible to create all the required features and functionalities with basic Excel formulas.

7. Quotation tool

7.1. The quotation tool development

Mr. Denis Pierchon, the head of Wärtsilä Marseilles had had the idea for the quotation tool for a long time. He had tried to develop it with Excel, but the lack of advance knowledge of Excel and time had postponed the development for a long time. I started to work for Wärtsilä Marseilles the 8th of January 2006. The development of the quotation tool started in February 2006. Three persons were named to the project: Mr. Pierchon as head of the project, account manager Mr. Degrassi as information provider and I as the developer and programmer of the tool. Also at that time we released the project's timetable seen in figure 7.1.

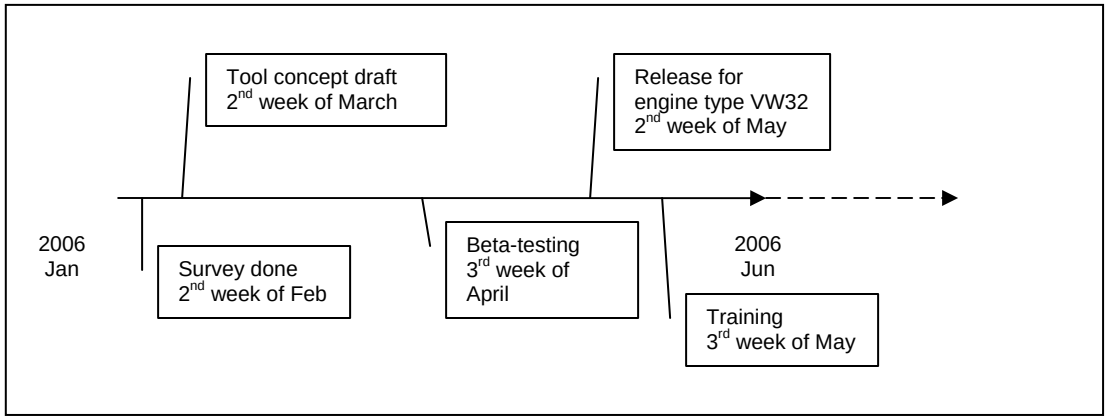


Figure 7.1 Tool development timetable

In the first phase of the project a survey was conducted to see how other Wärtsilä offices created quotations. The survey was conducted to four different offices. The selected offices were in Spain, Italy, Netherlands and Greece.

In mid-February after the survey was conducted the planning started on what kinds of functionalities and features the tool should have and with which software should it be created. One of the key features that were required from the tool is to be able to calculate easily the price for different engine installations. The maintenance of the same engine type can vary greatly depending of the vessel. Some vessels' engine rooms are smaller than others, thus assembly and disassembly times vary. This feature and the other features are explained more in detail in chapter 7.2.

In the second week of March the concept draft of the tool was released. It included the layout design and how the features will work. The features and the functionalities weren't functional yet, but the draft was to show how the tool will work and what where the relations of the data and what data is needed to be able to calculate the quoted price.

The creation of the tool started in the second week of March. The programming didn't advance as fast as expected. The tool had in the beginning only couple lines of simple VBA code and in the final release it had over 2400 lines of code. In the middle of March the project went to a standstill, because of lack the lack of information. There wasn't a proper service list with service hours and the project couldn't advance without it. The project was in a halt for three weeks. When the project continued after three weeks with the required information there was only couple of months left before I would leave Wärtsilä Marseilles and the tool wasn't even near completion. The planned timetable didn't hold and the tool was many weeks late of the planned dates.

In the last week of April the first version was released. Not near all the functionalities were in place, but the tool was functional. In the first tests a lot of bugs emerged. It took couple of weeks to correct the major bugs and in the second week of May a beta version was released. The functionalities were still limited for example new services couldn't be added. I started making longer days to be able to finish the tool before I would leave. For the last couple of weeks I worked 10 days hour catch up the delay, but still the tool wasn't finished the day I left Marseilles. The project continued back from Finland and in 10th of October the last version of the tool was released. It had all the wanted functionalities and no crucial bugs.

7.2. Main functionalities and features of the tool

The development started by stating what was wanted from of the tool. The tool had to be simple to use and the quotations had to be easily customized. The purpose wasn't to automate the quotation process. Expertise and knowledge had still to be used. The main purpose was to centralize the data, so that the information didn't need to be searched from different locations.

The core logic of the tool is to calculate a price with the following formula:

total man hours * hour rate + additional expenses

The total man hours is the sum of maintenance operations done to the vessel. Wärtsilä gathers this information from every maintenance operation that they do, so for example you could find how many hours it takes to disassemble, repair and assemble a camshaft. It is important to know at this point that most of maintenance and repairing is done at the workshop, not at the vessel. The parts are disassembled from the engine and brought to the workshop and then assembled back to the engine. This is because the space is limited in the engine rooms of the vessels and it would be almost impossible operating there.

Wärtsilä has a recommendation maintenance list that states what services should be done to the engine after certain running hours. The wear of an engine is measured by running hours, not by kilometers. Commonly the client doesn't follow the maintenance list by the letter, so the services offered have to be highly customizable. The services from the list can be chosen in two levels. The first level is the general level, for example include or do not include the maintenance of a cylinder. This includes all the services that are done to the cylinder. The second level is for including or not including a specific operation to the service, for example radial measurement of the cylinder can be removed.

One of most important feature is the *condition factor*. Since the disassembly and assembly times vary greatly depending of the vessel. The size of the engine rooms can be different size and in most cases they are really small when comparing to the size of the engine. It is common that structural elements of the engine room have to be disassembled or altered to be able to disassemble the part from the engine. Many cases special levers have to be built in the engine room to lift the part out of the engine according to Mr. Pierchon (Pierchon, 30.3.2006, interview). This all increases the total man hours and since the total man hours don't include this well, because the hours are averages a condition factor has to be added. The condition factor increases or decreases the total man hours by a wanted percentage. The account managers decide this percentage and they rely on their own knowledge when choosing it.

It is not the account managers who decide when the maintenance is done and in what period of time, but it is vessel's owner. The maintenance is done when the boat is docked. This can be on weekdays or weekends. The hour rates are different if the maintenance is happening on the weekdays or weekends, so the tool should handle either type of days. Also there are different types of service personnel with different hour rates. There are three types of service personnel: service mechanics, supervisors and superintendent. The tool can handle the different hour rates of the different types of personnel. Supervisors or superintendents do not always contribute to the workload and are only supervising the operation. This can also be

changed. The rates for different types of personnel also changed depending where the maintenance is done. The most common rate list is France, but also worldwide or offshore rates can be chosen. When offshore rates are used the maintenance operation is done on the move at sea.

The additional expenses are also a great cost in the maintenance operation. The additional costs are divided in to travel expenses and on site expenses. These costs range from restaurant expenses to outsourced labor expenses. It is not uncommon that a part of the labor is outsourced, for example the maintenance of turbochargers are outsourced to specialists (Pierchon and Degrassi, 27.2.2006, meeting).

7.3. Tool layout

The tool's layout was designed to have software like layout where all the functionalities are clearly represented. All the different sheet and areas are in a reach of two clicks. The navigation and main functionalities are located at the top of the tool. The navigation links are situated at the left of the top banner and functionalities at the right. Most of the functionalities that are situated in the top banner are commands, for example adding a new service or clearing all the information.

The green cells or zones refer to areas where information can be entered. The green cells are the only cells that need to be used and no other cell should be modified, because modifying other cells might influence the calculations or in the worst case they might make the whole tool un-functional.

The tool is constructed on six different sheets. The figure 7.2 shows the navigation possibilities of the top banner. The *service rates* and *free calculation* sheets are kept hidden unless accessed from the top banner or *free calculation* sheet from spreadsheet icon. This is because these two sheets do not have to be accessed often. Accessing the *free calculation* sheet by any other means than from the spreadsheet icon might corrupt the tool's functionality.

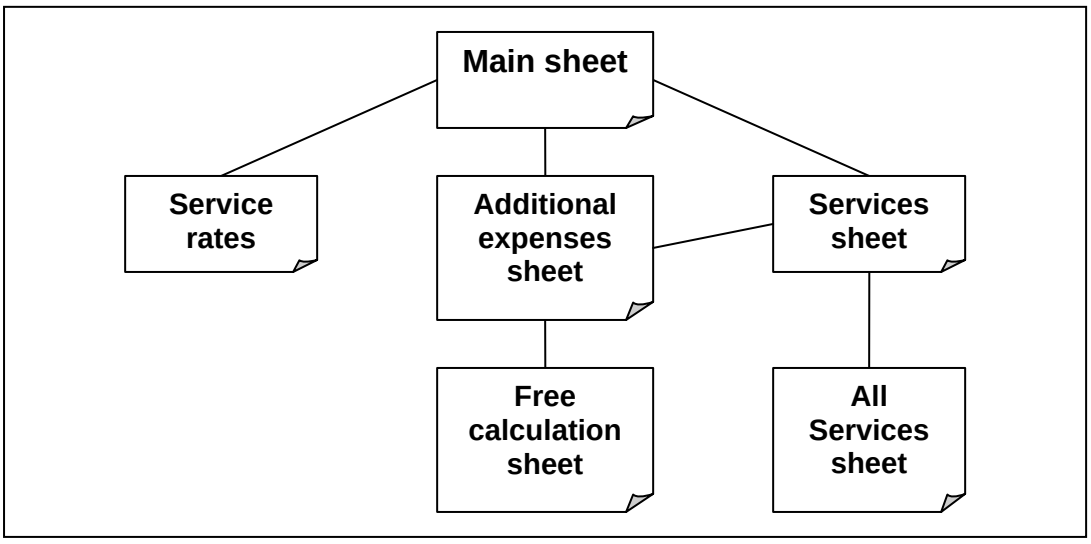
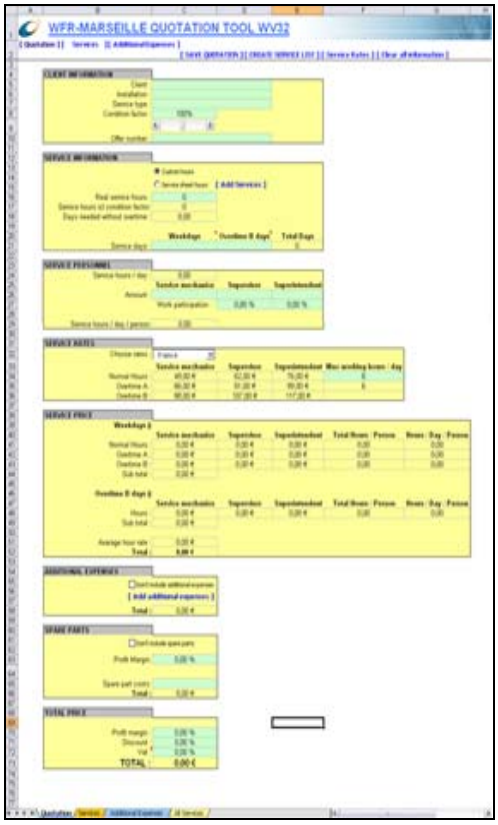


Figure 7.2 Tool's top banner navigation map

7.3.1. Main sheet

The main sheet consists of eight tables which are organized according to the data they hold and according to the quotation process (picture 7.3). The content of the tables are explained in chapter 7.4. The top banner has the following commands: *save quotation*, create *service list* for creating a usable list of the services for the quotation, *service rates* for modifying the hour rates of the service personnel and *clear all information* for clearing all information from different sheets.



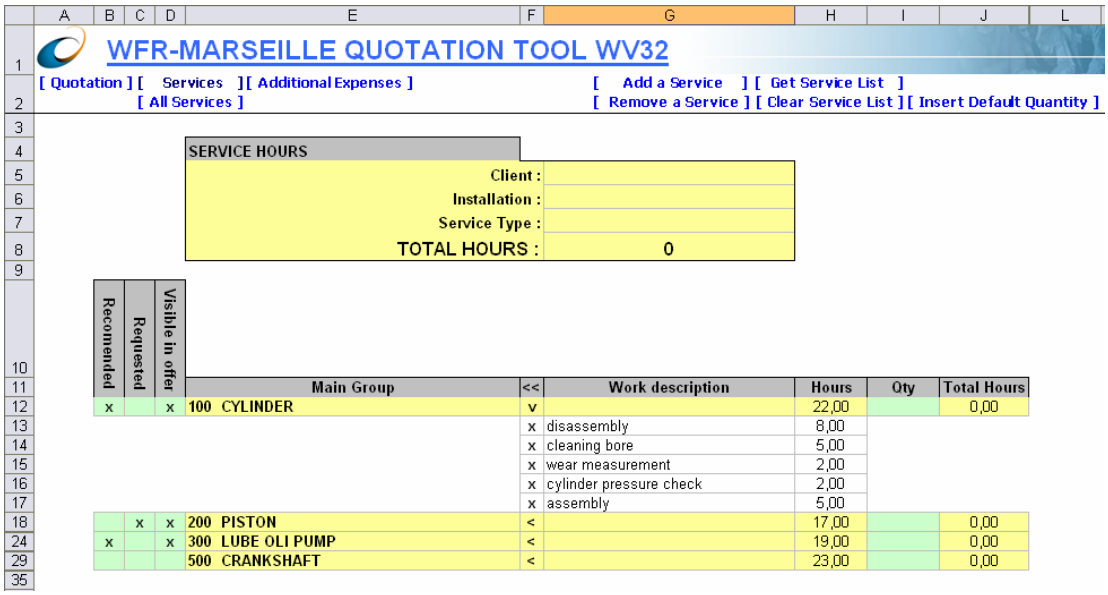
Picture 7.3 Main sheet of the tool

7.3.2. Services sheet

The service sheet is the sheet where the services can be chosen (picture 7.4). The services seen in the picture do not represent real services. Service times and the service operations are fictional. The reason for this is because of the confidentiality agreement not to publish the original times and also because the original list is in French. 4 fictional services have been entered to ease the explanation of the tool. The same services will be also used in the later chapters.

The service sheet is categorized in two tables. The *service hours* table shows the total hours that are selected from the *services* table. By double clicking the arrows next to the service opens the detail operations of that particular service. By re-double clicking the arrow closes the details. By double-clicking the double-arrow in the header level opens or closes are the details of all the services.

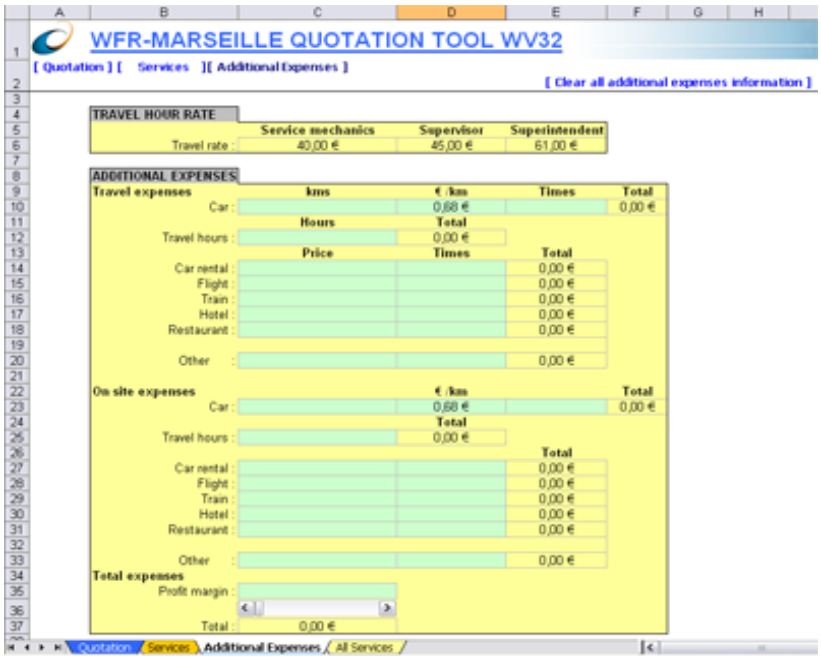
The *all services* sheet uses the same logic as this sheet. The visual appearance is a bit different. The detailed explanation of *all services* sheet can be found in chapter 7.4.4.



Picture 7.4 Service sheet of the tool

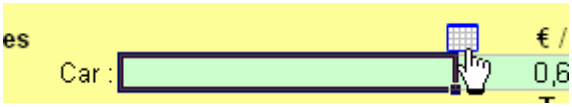
7.3.3. Additional expenses sheet

The *additional expenses* sheet has two tables: *travel hour rate* which has the travel rates of the different types of personnel and *additional expenses* table where different types of expenses can be calculated (Picture 7.5). The contents of *additional expenses* table is explained in chapter 7.4.5.



Picture 7.5 Additional expenses sheet of the tool

From the *additional expenses* sheet there is the possibility to access to *free calculations* sheet (picture 7.6) by clicking on the spreadsheet icon. The *free calculation* sheet is for calculation more complex additional expenses calculations, such as outsourced workforce costs. It is basically an empty sheet where calculations can be done freely. The result can be then imported to the *additional expenses* sheet. The value is imported to the cell from where the *free calculation* sheet was accessed.



Picture 7.6 Access to free calculation zone

7.4. Quotation tool tables and calculations

The structure of the tool is explained in detail in the next chapters. The chapters are categorized first by the sheet of the tool and then by the table.

7.4.1. Table and sheet relations

There are two main table relations in the tool service relation and service rate relation. These two relations are explained in the two following chapters. No more relations were programmed, because these are the weak points of the tool, because Excel doesn't handle well data relations.

It was also requested that the tool could gather history data of the chosen *condition factor* to help the choice in the future, but since this feature wasn't necessary for the functionality of the tool, it was removed. The reason for this was because it was impossible to create a relation with the history data, because the tool was going to be distributed to different persons, so the data will be different among every person.

The core of the tool is the service relation (figure 7.8). A lot of time was spent making it functional and reliable. From this relation the total man hours is calculated. *All services* sheet holds all the common services available. Services are also classified according to when they are recommended by Wärtsilä, for example the piston are checked after 8000 running hours. From the *services* sheet it is then possible to fetch the services list with for example all the services that Wärtsilä recommends to do after 8000 running hours pre-selected. This list can then be modified to get the total man hours wanted. The calculated total man hours in *services* sheet is linked with the *main* sheet's *service information* table. The relation can be cut at any sheet. The service list can be created entirely manually and it is also possible to input the man hours manually in the *service information* table.

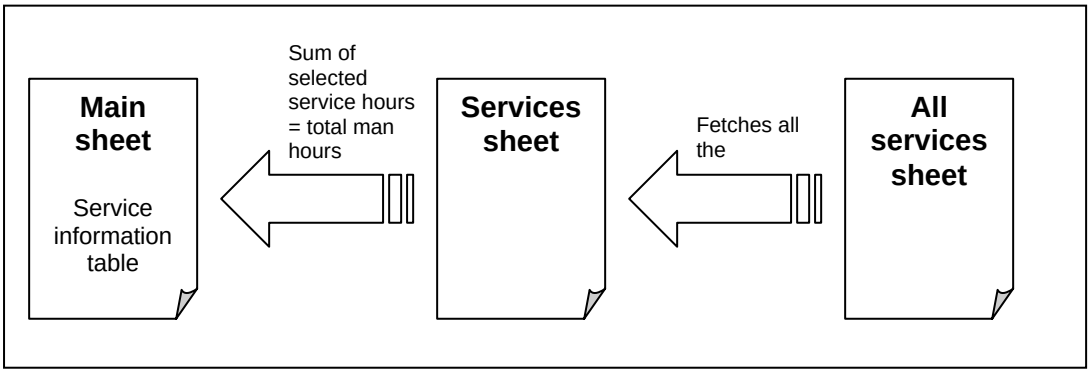


Figure 7.8 Service relation

The reason why the service list is fetched from a different sheet to another and not selected from all the services directly is because it is important to maintain an original list so that the data doesn't get corrupted easily and all the quotation start from the same base. The data could get corrupted easily in situations where the time of a particular service has to be changed and by creating this relation it is avoided.

The service rates relation is simpler than the service relation, because the quantity of data is less, less vital and doesn't require modification. The data is related among three sheets (figure 7.9). The rates are selected from dropdown menu at the *main* sheet *service rates* table. The selection triggers a command to fetch the information of the rate selected. The travel hour rates are displayed in *additional expenses* sheet's *travel hour* table.

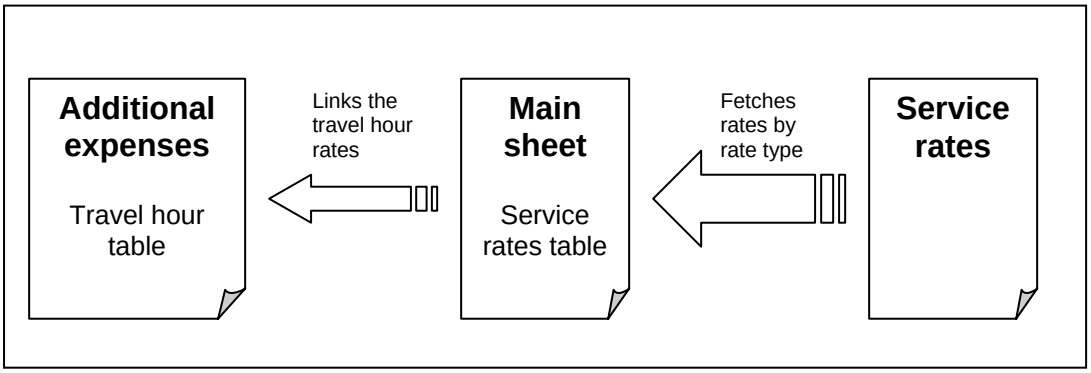
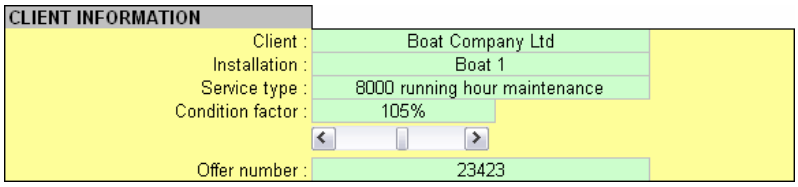


Figure 7.9 Service rates relation

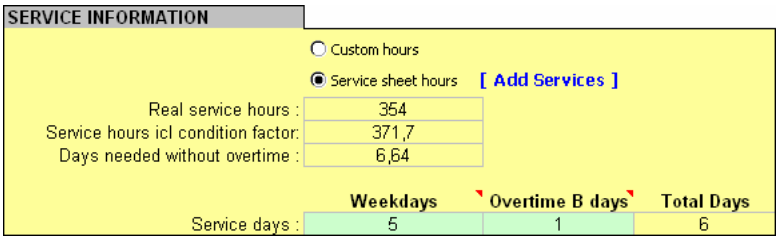
7.4.2. Main sheet tables

Client information table holds the basic information of the client, the vessel and about the maintenance (picture 7.10). In this table it is possible to adjust the *condition factor*. The condition factor doesn't adjust the quotation price directly, but it affects it indirectly by increasing the total man hours. It increases it by the selected percentage that is over 100 percent. The default percentage is 100 percent. That percentage doesn't increase the total man hours. The percentage can also be decreased for vessels where the maintenance operations are easier than in average.



Picture 7.10 Client information table

Service information table includes the total man hours and in how many days the maintenance operation is made (picture 7.11). The total man hours can be either entered manually or it can be fetched from the *services* sheet. The table also calculates how many days are needed to complete the maintenance without overtime if the service personnel are already entered. The days are classified in normal weekdays and overtime B days. The Overtime B days are Saturdays, Sundays and national holidays. This information is entered because the hour rates are different depending of the type of the day. Small maintenance operations are commonly done on the weekends, because on the weekdays the vessels need to be operational (Pierchon, 30.3.2006, interview).



Picture 7.11 Service information table

Service personnel table is for entering the amount of service personnel working in the maintenance operation (picture 7.12). The table shows the required service hours per day and also how many hours does one person need to do per day. The participation factor of the supervisors and superintendents can also be adjusted. In many small maintenance operations the supervisor equally "consumes" the total man hours, but in big operations

they just supervise the operation. The percentage indicates how much time is used in “consuming” the man hours. 100 percent means that the supervisor “consumes” as much man hours as a service mechanics.

SERVICE PERSONNEL			
Service hours / day :	61,95		
	Service mechanics	**Supervisor**	**Superintendent**
Amount :	5	2	
Work participation :		100,00 %	0,00 %
Service hours / day / person:	8,85		

Picture 7.12 Service personnel table

Service rates table is for selecting the service personnel’s hour rates (7.13). The rates can be selected from the dropdown menu. The rates can not be modified in this table. The rates are fetched from the *service rates* sheet. The rates are classified in three groups. The normal hour group includes hours that are done within normal working hours. The maximum working hours can also be changed for cases where traveling hours take a significant part of the normal working hours. The max working hours of overtime A can not be modified, because it is fixed value that Wärtsilä has determined.

SERVICE RATES				
Choose rates :	France			
	Service mechanics	**Supervisor**	**Superintendent**	**Max working hours / day**
Normal Hours :	49,00 €	62,00 €	76,00 €	8
Overtime A :	66,00 €	81,00 €	99,00 €	6
Overtime B :	88,00 €	107,00 €	117,00 €	

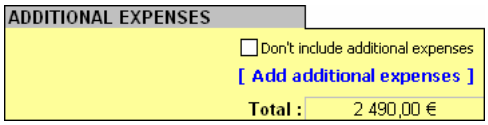
Picture 7.13 Service rates table

Service price table is categorized in two parts (picture 7.14). The first part shows the costs of weekdays and the second part shows the cost of overtime B days. The costs of the normal hours are determined by the value of the max working hours of the previous table. Hours that exceed that value are calculated in *overtime A* row to the limit of 6 working hours. If the hours still exceed the limitation of 6 hours of overtime A, they are calculated as *overtime B* hours. Overtime B days calculates the whole workload of the day with the overtime B rate.

SERVICE PRICE					
Weekdays (5)					
	Service mechanics	**Supervisor**	**Superintendent**	**Total Hours / Person**	**Hours / Day / Person**
Normal Hours :	9 800,00 €	4 960,00 €	0,00 €	40,00	8,00
Overtime A :	1 402,50 €	688,50 €	0,00 €	4,25	0,85
Overtime B :	0,00 €	0,00 €	0,00 €	0,00	0,00
Sub total :	16 851,00 €				
Overtime B days (1)					
	Service mechanics	**Supervisor**	**Superintendent**	**Total Hours / Person**	**Hours / Day / Person**
Hours :	3 894,00 €	1 893,90 €	0,00 €	8,85	8,85
Sub total :	5 787,90 €				
Avarage hour rate :	60,91 €				
Total :	**22 638,90 €**				

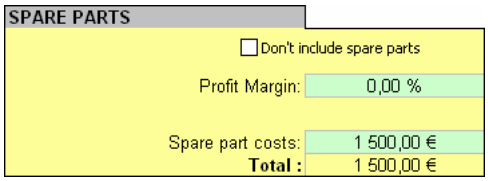
Picture 7.14 Service price table

Additional expenses table is for selecting whether additional expenses are included in the quotation (picture 7.15). In some cases the client might want to exclude these from the quotation. This doesn't mean that there aren't any additional expenses, but it means that the client wants that they are invoiced after the maintenance operation (Degrassi, 19.4.2006, interview). The additional expenses are calculated in a separate sheet. The *additional expenses* sheet is explained in chapter 7.4.5.



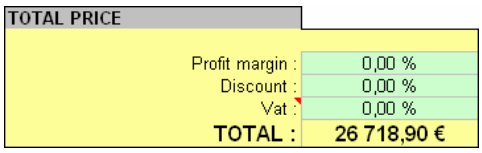
Picture 7.15 Additional expenses table

Spare parts table is for including the costs of spare parts (picture 7.16). The tool doesn't include the spare parts listing or the prices. The spare parts' prices are in Wärtsilä's SAP ERP system. It is also possible not to include the costs of spare parts, because in some maintenance operations the spare parts costs are not included in the quotation directly. This is because it is impossible to determine beforehand what parts need to be changed. The client will receive a list of parts that are most likely replaced.



Picture 7.16 Spare parts table

Total price table is the last table in the *main* sheet (picture 7.18). It shows the final price that can be offered to the client. A profit margin, discount or value added tax can be still added to the final price.



Picture 7.18 Total price table

7.4.3. Services sheet tables

The *services* sheet has two tables. The *service hours* table summarizes the client information entered in the *main* sheet. It also calculates the total man hours from the services selected in the *services* table. The *services* table is for selecting the services for the maintenance operation (picture 7.19). The service that is been selected can be either a recommended or a requested

service. The recommended services are services that Wärtsilä recommends and the requested services are services that the client has particularly requested. The services can be either fetched from *all services* sheet or they can be entered manually. The services are categorized by a tree digit number and the object of maintenance, for example “100 CYLINDER” or “200 PISTON”. The service operations that are done to the object are displayed in the *work description* column. The *quantity (Qty)* column is for entering to how many objects the service is done, for example in the picture below the service operation of the cylinder is done to eight cylinders.

Recomended	Requested	Visible in offer	Main Group	<<	Work description	Hours	Qty	Total Hours
x		x	100 CYLINDER	v		22,00	8	176,00
				x	disassembly	8,00		
				x	cleaning bore	5,00		
				x	wear measurement	2,00		
				x	cylinder pressure check	2,00		
				x	assembly	5,00		

Picture 7.19 Services table

7.4.4. All Services sheet table

All services sheet has only one table (picture 7.20). The table is the list of all the maintenance operations. Repair operations are excluded from the list. A service operation can be added to be as a recommended service after certain running hours, for example in the picture above the *100 cylinder* is recommended to be done after 12000 running hours. This is for when the services are fetched to the *services* sheet the account manager can select that the service operations of for example 12000 running hours are automatically selected.

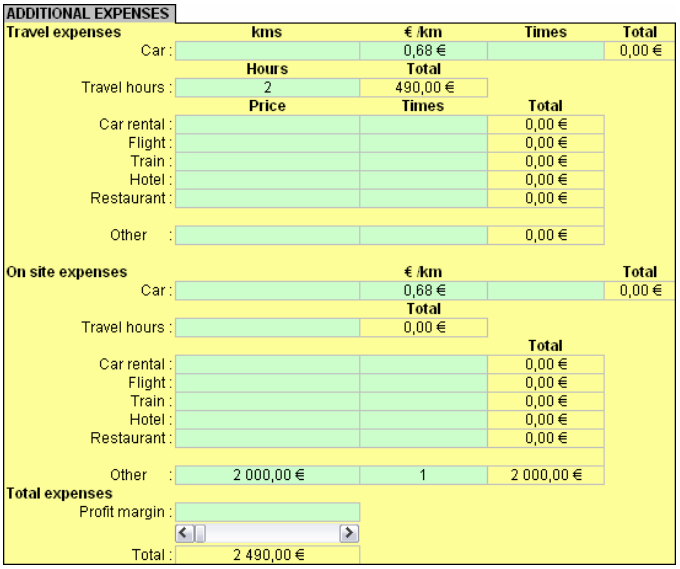
8000	12000	16000	Main Group	<<	Work description	Hours
	x		100 CYLINDER	<		22,00
x			200 PISTON	<		17,00
x	x	x	300 LUBE OLI PUMP	<		19,00
		x	500 CRANKSHAFT	<		23,00

Picture 7.20 All services table

7.4.5. Additional expenses sheet table

The *additional expenses* sheet is for calculating all the other expenses of the quotation. The sheet has two tables: travel hour and additional expenses table. The *travel hour* table fetches the hour rates of traveling from the *main* sheet. These values can not be modified. The *additional expenses* table has calculation fields for the most typical additional expense types from car rental to hotel (picture 7.21). The expenses are divided into travel expenses and

onsite expenses. From this table it is possible to access the *free calculation* sheet where any type of calculation is possible.



ADDITIONAL EXPENSES

Travel expenses	kms	€ /km	Times	Total
Car :		0,68 €		0,00 €
	Hours	Total		
Travel hours :	2	490,00 €		
	Price	Times	Total	
Car rental :			0,00 €	
Flight :			0,00 €	
Train :			0,00 €	
Hotel :			0,00 €	
Restaurant :			0,00 €	
Other :			0,00 €	

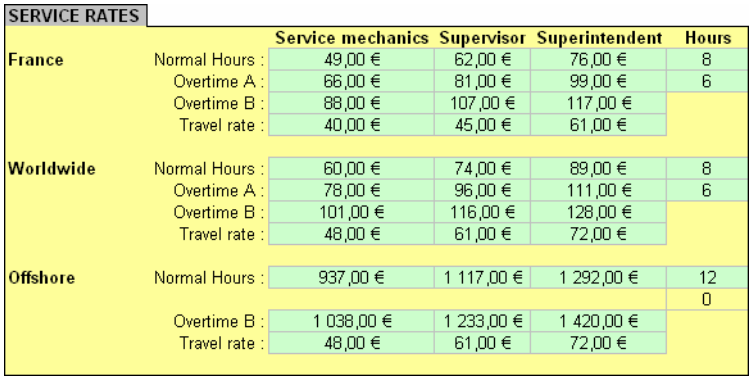
On site expenses		€ /km		Total
Car :		0,68 €		0,00 €
		Total		
Travel hours :		0,00 €		
			Total	
Car rental :			0,00 €	
Flight :			0,00 €	
Train :			0,00 €	
Hotel :			0,00 €	
Restaurant :			0,00 €	
Other :	2 000,00 €	1	2 000,00 €	

Total expenses	
Profit margin :	
Total :	2 490,00 €

Picture 7.21 Additional expenses table

7.4.6. Service rates sheet table

The *service rates* sheet has the information about the different types of rates (picture 7.22). This sheet doesn't need to be accessed or modified often, because the rates are fixed by Wärtsilä.



SERVICE RATES

		Service mechanics	Supervisor	Superintendent	Hours
France	Normal Hours :	49,00 €	62,00 €	76,00 €	8
	Overtime A :	66,00 €	81,00 €	99,00 €	6
	Overtime B :	88,00 €	107,00 €	117,00 €	
	Travel rate :	40,00 €	45,00 €	61,00 €	
Worldwide	Normal Hours :	60,00 €	74,00 €	89,00 €	8
	Overtime A :	78,00 €	96,00 €	111,00 €	6
	Overtime B :	101,00 €	116,00 €	128,00 €	
	Travel rate :	48,00 €	61,00 €	72,00 €	
Offshore	Normal Hours :	937,00 €	1 117,00 €	1 292,00 €	12
					0
	Overtime B :	1 038,00 €	1 233,00 €	1 420,00 €	
	Travel rate :	48,00 €	61,00 €	72,00 €	

Picture 7.22 Service rates table

7.5. Quotation creation process

The creation of a quotation with the tool has been simplified as much as possible. The outcome of tool is not a quotation that can be sent to the client,

because the tool doesn’t handle terms and condition. The tool calculates the price and creates a service list that can be attached to the quotation.

The process for creating a quotation with the tool starts with entering the client information and the condition factor (figure 7.23). After the client information is entered, the services are selected. This can be from the service list or they can be entered manually. The time period of the maintenance is usually given by the client. The next step in the process is choosing how many people are sent to the maintenance operation. This depends on the availability of the personnel, total man hours and of the time period given by the client. After these steps the tool can calculate the man hour costs. The last steps before the final price is know, is to add the additional expenses and the spare parts costs.

At this point the quotation calculations are ready and quotation can be saved for future revision or editing and the service list can be exported to the official quotation. When the quotation is saved all the information entered are stored so that if the quotation has to revised for example new services have to be added, the information doesn’t have to be re-entered.

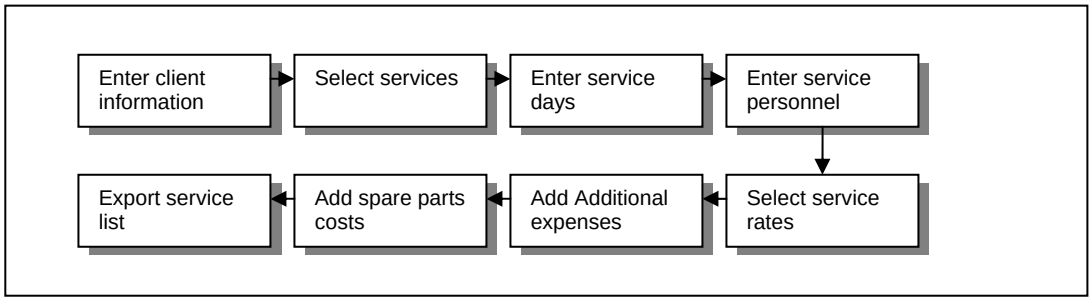


Figure 7.23 Quotation creation process with the tool

8. Conclusion

The goal of the project was to decrease the time taken to respond to a demand of quotation. To achieve this goal the quotation process was redesigned. The process was redesigned to be simpler. Most of the unnecessary paper work was removed. This was done by creating a quotation tool that had all the basic maintenance operation and their times. The manual calculation work was also transferred to the tool.

No key performance indicators were set to the project, so no measurable data can be collected to measure if the process redesign improved the response times. Most likely the overall quotation response time at this point wouldn't have decreased much, because the process redesign is only valid at this point to Wärtsilä Vasa 32 engines, because the tool data was only for that engine. The tools maintenance database should now be increased to cover all the popular engine types.

Despite the fact that there were no real indicators to measure the success the tool, it will help the account managers to create the quotations, since there is no more need to search information from maintenance catalogues and estimate the man hours. The tool also helps to decrease the variance of prices calculated between different account managers, because the man hours are no more estimates but are based on real measured times and because the calculations method and process for calculating the price is the same.

If the tool is now in use and if other engine types are included into the tool is unknown, because I am no more working for Wärtsilä Marseilles.

9. Summary

The purpose of this research is to improve the maintenance quotation process of Wärtsilä Marseilles. Wärtsilä's core business is vessels' propulsion solutions. This includes all parts from the engine to the rotor of the vessels. The aim of this research is decrease the response time for maintenance quotation, for example a quotation of maintenance of an engine after 8000 running hours. In these types of maintenance the service operations are mostly the same, but whole maintenance operation varies a lot. The main problem of their quotation process was that it required a lot of unnecessary manual work. The account managers who create the quotations had to search the information from different catalogues and estimate the man hours needed in the maintenance operation. This is a time consuming process.

Action research method was chosen as the process of research. This was because no measurable data existed of the un-efficiency of the process. Action research process is an ongoing spiral of four phases. These four phases are repeated until the research is completed. The first phase the first cycle of the spiral is planning. The second phase is called action. In this phase the planned objectives are executed. In the third phase the action is observe and to collect data. The last phase before the loop re-starts is reflection. In this phase the collected data is analyzed. When the collected data is analyzed, a new cycle can start with planning based on the analyzed data of the reflection phase.

By improving the response time also improves the service perspective. Many companies think that they are practicing service perspective, because they are providing good billable services, but this is only one part of the service perspective. An important part is also the non-billable services. Non-billable services are services that cannot be easily calculated in turnovers. Improving the response time is improving a non-billable service. Practicing service perspective is a good strategy in a long-run, because it adds additional value to the customer and thus increases the probability of a long relationship to the customer. This is because service perspective decreases the difference of the expected service and actual service and less there is difference leads to customer retention.

The majority of the maintenance quotations are quoted to businesses and not to consumers. The decision-making process of these two types of clients differs. One of the main differences is that the consumer can be the only person in the decision-making process. This is rarely the case in organizations where many people can be included in the process. The

organizations tend to have more specific needs than consumer, thus the quotations have to be highly customized.

The maintenance quotation process was redesigned to be simpler by removing most of the manual work such as manual calculations and information search from catalogues. This was done by creating a quotation tool with Microsoft Excel. The measured times of the maintenance operations were converted to be applicable into quoted maintenance services. This eliminates the need of estimations of man hours and search of information from catalogues. The services can be selected easily from the tool which calculates the total man hours. The calculation process was also harmonized. Every account manager had their own way of calculating the quoted price. The tool calculates the quoted price automatically with the required data entered into the tool. This decreases also the variance of the quoted prices for the same vessel between different account managers.

Since no key performance indicator were set, it is unknown if the process redesign has helped to decrease the response time. Most likely at this point it wouldn’t have made a great impact, because the tool was released for only one engine type. Other engine types’ maintenance data would have to be included to have a bigger impact.

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