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# Identifying Customer Value in Building Plant Solution Proposals in Minerals Processing

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## **Preface**

In winter 2014, while searching for the subject for the study, I noticed that there were a lot of interesting opportunities in the case company. After working for about ten years mainly in the engineering and project delivery organizations, I thought that it would be beneficial to search for the subject of the study out of the comfort zone. I wished a subject which would bring personal growth and an opportunity to learn from the solution business, and consider the business from the customer perspective.

The subject I found was exciting but sometimes proved to be quite a challenging journey. I was lucky to have interest and involvement from my company instructor, Antti Jore, my nearest colleagues and the team who participated in the study. Several people contributed both directly and indirectly to the content and to the writing process of this study. Although the subject was quite open in the beginning of the study, it was focused and crystallized during the research process and finally the customer value was selected as a key area for improvement.

I would like to express my gratitude to my instructor, Dr Thomas Rohweder, for his inspiring lectures and help in this study work and for the joy of professional discussions with him. I also wish to show my gratefulness to Dr Marjatta Huhta and Zinaida Grabovskaia, PhD, for their deep commitment and helpfulness in the challenges faced during the studies and writing process. Additionally, I would like to express my thankfulness to all lecturers and study-mates of the Industrial Management program who enabled this good learning experience. Special thanks go also to my colleagues and to my supervisor, Tuomo Sipilä, for giving me the opportunity to participate in the program and full support in this work.

Finally, I would not have any means to accomplish this journey without the endless support, flexibility and patience from my wife, Jaana, to make the whole opportunity possible. My children, Sabina and Sebastian, I wish to thank you too for helping daddy with your infinite love, numerous hugs and endless forbearance.

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<p>This Master's Thesis addresses a real-life case company challenge. This study was conducted for identifying customer value in building plant solution proposals in the unit of this study. The unit of this study is working in the minerals processing industry and has a long tradition in equipment manufacturing business, though lately the company has changed its focus towards the plant solution business. Although the plant solution business has provided an opportunity to grow the revenue and margin, the case company is experiencing problems in building attractive and competitive plant solutions.</p> <p>The study was conducted as an action research study started by indentifying the business challenge. The current state analysis was conducted to analyze the case company, its operations and the current process of building the plant solution proposal. Data for the current state analysis was collected from the case company internal documents and open-end interviews conducted with the key stakeholders. The current state indicated that the case company lacks the tools to identify customer value in customer proposal building. Therefore the study proposes some conceptual tools that would help the solution sales teams to gather and analyze the customer value drivers in plant solution building. The proposal for the conceptual tools was created by comparing the findings from the current state analysis in the case company to the best practice found from the business and research literature, and a wide discussion which involved the key stakeholders from the case company.</p> <p>The identification of the customer value and the creation of the customer value proposition are challenging areas that are mutually dependent and influence each other. Therefore, a structured way of identifying and gathering the drivers of the customer value was proposed. The outcome of this study is a structured process to analyze customer value in the plant solution building. The other result of this study was a questionnaire template for the sales teams to help them in identifying and gathering the customer value data which can be used in customer proposal building.</p> <p>This study was validated internally and considered as a significant starting point for the development of the customer focus in the plant solution building of the minerals processing unit in the case company.</p>	
Keywords	Solution business, customer value

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## 1 Introduction

Traditional business models in manufacturing industry are increasingly coming under change. Selling products, spare parts and support services is no longer enough, and firms need to find new ways of capturing value and growth. A term “Solution Business” has been recently launched as an answer to these challenges. The transformation from a product manufacturer to a solution provider has been very challenging for the firms that have a strong equipment manufacturing background. As these firms attempt to become solution providers, the firms need to change their business models in several ways. Solution business requires more focus on customer and more integrated offering. The challenges in fulfilling of these requirements in customer solution process are the starting points of this study project.

In manufacturing industry, the customer focus and more integrated offering are typically perceived as challenges in the creation of competitive plant solution proposals. Competitive solutions require technical and organizational flexibility and modular thinking. Since their influences are cross-organizational, firms need to re-consider their operational processes and practices.

This study is aimed at improving the plant solution proposals in a big technology company. The purpose of this study is to recognize the caps in the current operational model and propose improvements in order to improve the customer focus of the plant solution proposals.

### 1.1 Proposal Management and Building of Plant Solution Proposals

The case company of this study is a global technology company, which develops and delivers equipments and plant solutions to mineral and metal industry. The unit of this study is the Proposal Management unit, which a sub-organisation of the case company’s solution sales organisation. The proposal management unit is responsible for the creation of the plant solution proposals and cost estimation for particular sales cases. Typically, the proposal management is participating to the solution sales from the early indications and contacts with the customer. Proposal management supports sales managers in their work by preparing indicative price information followed by

budgetary offers and finally until the firm price quotations. The preparation of the proposals is always executed through the plant solution creation process. The creation process of plant solutions is a cross-organisational exercise which aims to build the best possible plant solution from the company's product and service offering.

## 1.2 Business Challenge

The business challenge in this study concerns of improving the customer focus of the plant solution proposals. Due to the strategic change in 2010 and subsequent operational and organizational changes during the transformation process, the plant solution business is having profitability problems and low hit-rate in sales. Currently, the case company is having the solution proposal creation process in place. However, it seems to be not exactly clear and not fully utilized. There are also some fundamental issues that are causing challenges for the solution sales. These challenges relate to a high cost structure as well as a long time for creating solution proposals. In consequence, the overall quality of the proposals may come in jeopardy and need actions to improve them.

## 1.3 Objective and Scope

This study is targeted to identify the customer value in plant solution building. The improvements are addressed to point out the organizational and operational challenges in plant solution building process, namely – to propose improvements so that the current operational model is focusing on identifying and analyzing customer value.

The research question of the study can be formulated as follows:

*How to identify customer value in building plant solution proposals in minerals processing?*

The outcome of this study project is a proposal of improvements for the operational process of building the plant solution proposals in order to increase the competitiveness and quality of the case company's solution proposals. This improvement proposal is focused on suggesting the tools that would help to better identify customer value. A better customer value identification should lead to better and faster outcomes for build-

ing plant solution proposals in mineral processing. The scope includes the plant solution sales and customer proposal creation processes.

This report is written in seven sections. Section 1 introduces and provides the reasons for the business problem addressed in this study. It presents the purpose and identifies the boundaries of the study. Section 2 illustrates the research design and describes the data collection and analyzing methodology, and defines the validity and reliability plan of the study project. To be able to build better understand the current situation in the case company, the current state analysis was executed. Section 3 presents the results of the current state analysis of the plant solution proposal creation in the case company. It compares the strengths and weaknesses of the current state and summarizes the key findings from the current state analysis. Based on the findings from the current state analysis, literature search was implemented. In Section 4 the existing knowledge and best practice found from the literature is discussed. Based on the findings from the literature, the conceptual framework of this study is created. Merging the findings from the current state analysis and the conceptual framework, Section 5 builds the initial proposal to improve the customer focus in plant solution creation. The initial proposal is validated and finalized in Section 6. This section also presents recommendations for next steps. Finally, Section 7 discusses the study results and presents the summary of the report.

## 2 Method and Material

This section describes the research method and introduces the research design of this project. It discusses of the research approach and describes the data collection and analysis methods. Finally, it builds validity and reliability plan to establish solid foundation for this study project.

### 2.1 Research Approach

The research approach used in this study is action research (AR). The action research method is known of its validity in finding improvements to practical management problems (Coughlan & Coughlan 2002: 238). Action research is a deliberate, cyclical process of planning, taking action and evaluating. (Coughlan and Brannick 2006: 6) Different interpretation of AR may vary in the underlying assumption and view of the participants (French 2009: 190), but the key principles stay the same. Rigour is important in action research. Since, doing the research in own organization, researcher holds a dual role; organizational role and researcher role. This double role conjures up questions of role conflict, trust and privileged access to data. Researcher must be able to manage both of these roles. The researcher role requires detached, theoretic, objective and neutral observer position. (Coughlan and Brannick 2006: 49) Since the study is exploring a practical business challenge, this approach was selected as a suitable participative and experimental research approach.

Action research is the type of research that focuses more on action instead of researching *about* the action. It follows a cyclical four-step process and participate those who experience these issues directly to the process. An AR cycle is shown in Figure 1 below.



Figure 1. Action research cycle

As seen in Figure 1, the four-step AR process consist planning, taking action, evaluating the action and leading to further planning phases. The learning gained from the initial cycle feed into planning of the second cycle, for which the action plan is modified and the research process repeated. In this study, the planning phase consisted business challenge identification, current state analysis and building of the conceptual framework. These findings were used for building the initial proposal in acting phase. Further on the initial proposal was validated in the observing phase and finally implemented to get reflection from the real life. The reflections from the implementation shall be used for revising the initial plan and further development of the proposal in the second cycle. The main idea of AR is to use scientific approach to study the resolution of important social or organisational issues together with the practitioners (Coughlan & Coughlan 2002: 222-223). The practitioners were participated to the study in two phases. First, the practitioners were conducted to the current state analysis by interviewing them from the current practices. Secondly, the practitioners were involved in the building of the initial proposal in workshops. In AR, the challenge is approached iteratively and improved cycle by cycle. The practitioners are not only searching improvements to their practice, but are also testing and re-evaluating the improvements in action.

The action research was chosen since the researcher of the study was working in the case company and acting as one of the key stakeholders and practitioners of the plant solution building.

## 2.2 Research Design

This study was conducted following the action research approach. Figure 2 illustrates the step-by-step research process applied in this project.

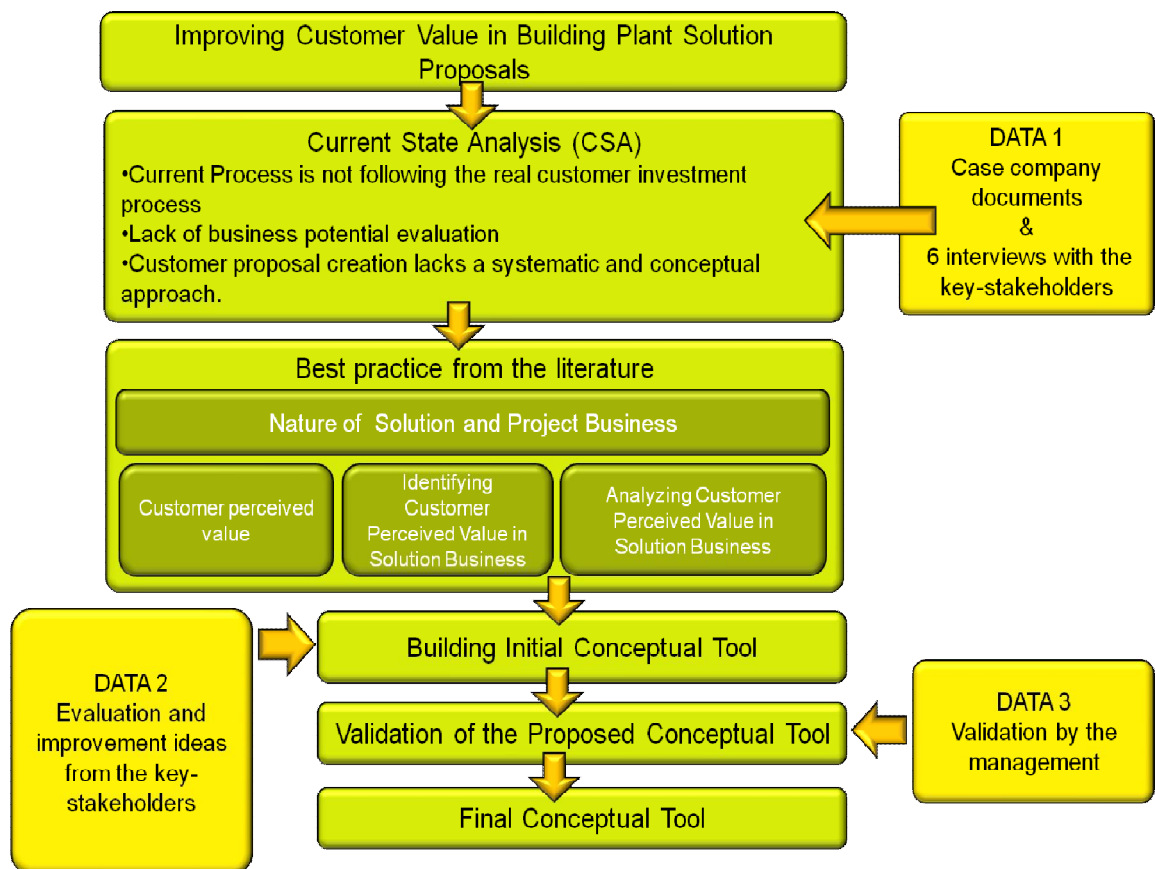


Figure 2. The research design of this study.

Figure 2 presents the step-by-step research process utilized in this study. The study starts by recognizing the research problem and forming the research objective. The research problem is searched from the real life business environment by investigating the current business challenges in the case company. After recognizing and selecting the current business challenge, the research objective of the study project is defined.

In the second step, the current state analysis is conducted. The current state analysis is based on a study of the current business processes and interviews of the solution sales managers, solution proposal managers and other practitioners in the solution proposal creation process. After identifying the current state and challenges, these findings are compared to the best practice found from the literature.

Best practice for the theories and ideas found from the literature are examined to help to build an understanding of the reasoning behind the current challenges. In the fourth step, the conceptual framework and the current state analysis are merged for building the initial proposal for improvements. The initial proposal is built together with the key practitioners participated in the development session. Finally, the initial proposal is reviewed by the owner of the solution proposal creation process. After the review by the process owners, the final proposal is ready to be provided for the solution sales management.

### 2.3 Data Collection and Analysis

Data collection in this Study consists of three parts. The primary data sources for Data 1 were the key stakeholders and practitioners of the process. The current business process was used to build a background for the existing knowledge. The data was collected in three data collection stages. Data 1 was conducted to analyse the current situation and practices in the case company as well as pinpoint the key development areas. Data 2 was conducted to build initial proposal. A preliminary version was built by the researcher based on the findings, conceptual framework and researcher's conclusions. This was evaluated and fine tuned by the key stakeholders. According to this the initial proposal was build. In Data stage 3, the initial proposal for improvements was validated by the management. The details of Data collection is shown in Table 1, Table 2 and Table 3.

Table 1. Case company documents in data 1.

Data ID	Type	Topic	Organisation	Date	Document and Source
A	Document	Operational Structure	Case Company	2015	Figure 3 Case company intranet (February 2015)
B	Document	Operational Structure	Minerals Processing	2015	Figure 4 Case company intranet (February 2015)
C	Document	Sales & Delivery Operating Model	Minerals Processing	2015	Figure 5 Case company intranet (February 2015)
D	Document	Solution Sales Business Process	Minerals Processing	2015	Figure 6 Case company intranet (February 2015)

As shown in Table 1, Data 1 contains relevant information for understanding the current state of the case company, its operational structure, operating model and current way of working in the solution sales and solution proposal creation. The data used for analysing the current state was collected from the case company internal documents (Data 1 A - D). This data was enhanced with the interviews of the key stakeholders of the plant solution creation. The details of the interviews in Data 1 are shown in Table 2.

Table 2. Key stakeholder interviews in data 1.

Data ID	Type	Position	Person ID	Date	Duration	Document
E	Interview (telephone)	Solution Sales Manager	1	6.2.2015	60 min	Field notes Appendix 1
F	Interview (telephone)	Solution Sales Manager	2	9.2.2015	60 min	Field notes Appendix 1
G	Interview (face-to-face)	Solution Sales Manager	3	9.2.2015	60 min	Field notes Appendix 1
H	Interview (face-to-face)	Proposal Manager	4	12.2.2015	60 min	Field notes Appendix 1
I	Interview (face-to-face)	Engineering Manager	5	17.2.2015	60 min	Field notes Appendix 1
J	Interview (face-to-face)	Head of Plant Engineering	6	24.2.2015	60 min	Field notes Appendix 1

As shown in Table 2, totally six key stakeholders were interviewed for this study. The open-end interviews were conducted either by phone or in face-to-face meetings (Data 1 E-J). The purpose of the interviews was to get the understanding of the operations in practice and to identify the practical challenges in the building of the plant solution proposals.

The operating model and role of the solution sales and proposal creation was gathered from the internal documents (Data 1 A - D). The analysis of the current way of working was based on the results of the interviews (Data 1 E – J).

Data 1 was finalized with the validation of the current state analysis by the management. The results from the current state analysis was presented to the management and requested for validation. This was conducted in a group session. Table 3 illustrated the data collected from the management session for Data 1.

Table 3. Validation of the results of the current state analysis.

<b>Data ID</b>	<b>Type</b>	<b>Person ID</b>	<b>Position</b>	<b>Date</b>	<b>Duration</b>
<b>K</b>	Group interview	7	Head of Proposal Management	17.3.2015	120 min
		8	Head of Solution Sales		

As shown in Table 3, the results of the current state were validated by the managers of the solution sales and proposal management. In this group interview the results of the current state analysis was validated by the management and the focus area of this study was selected. After getting the validation for the results of the current state analysis and defining the focus area, the literature search and building of the conceptual framework was started.

Data 2 consists of the notes from the workshop held together with the key stakeholders. Table 4 describes Data 2 in more detail.

Table 4. Workshop sessions in data 2.

Data ID	Type	Person ID	Position	Date	Duration	Document
<b>L</b>	Workshop 1	1	Solution Sales Manager	14.4.2015	120 min	Field notes Appendix 2
		2	Solution Sales Manager			
		3	Solution Sales Manager			
		4	Proposal Manager			
		5	Engineering Manager			
		6	Head of Plant Engineering			
<b>M</b>	Workshop 2	1	Solution Sales Manager	17.4.2015	120 min	Field notes Appendix 3
		4	Proposal Manager			
		5	Engineering Manager			
		6	Head of Plant Engineering			

Data 2 was collected from the workshops with the key stakeholders. In the first workshop, the findings from the current state analysis and selected improvement area were studied and evaluated. After finding common understanding of the current state, the initial proposal conceptual tools was discussed. The participants agreed that the case company is not having the customer value analysing process in place and it is needed. However, a lot of discussion was done about the timing of the customer value analysis. Based on the discussion, the initial proposal for the process was build. After, defining the process the questionnaire template was discussed and initial ideas of the customer value survey questions were collected. In the second workshop, the initial process was evaluated and fine tuned. The major topic in this workshop was to evaluate and build a questionnaire template for customer value survey which can be used in the process of analysing the customer value in plant solution building. Accordingly, the initial proposal for conceptual tool was finalized to be ready for validation.

Finally, the management was involved into the study by validating the initial proposal. Table 5 illustrated the data collected for Data 3 stage.

Table 5. Validation of the initial proposal in data 3.

Data ID	Type	Person ID	Position	Date	Duration	Document
N	Group interview	7	Head of Proposal Management	21.4.2015	60 min	Field notes Appendix 4
		8	Head of Solution Sales			

As shown in Table 5, the data for Data 3 was collected from the management of the Solution Sales and Proposal Management units of the Minerals Processing BA. In this group interview, the initial proposal was introduced to the management and the management was requested for a feedback and validation of the initial proposal.

#### 2.4 Validity and Reliability Plan

The quality of action research (AR) is dependent on validity and reliability of the research. (Näslund et al. 2010: 338)

The evaluation of the reliability of the research is considered through its trustworthiness and authenticity. It measures how well the research project has been carried out. Is it carried out in such a way that, if another researcher were to look into the same questions in the same setting, another researcher would come up with essentially the same results. If so, then the work might be judged reliable. (Blaxter 2006: 221) Validity refers to accuracy of the research and evaluates the methods, approaches and techniques actually relate to, or measure, the issues have been explored. (Blaxter 2006: 221)

Various data sources and collection methods is used to increase the credibility and transferability of this study. To foster the authenticity, the results and proposal is examined by the key-stakeholders and management to challenge and further develop the proposals created. The researcher has worked in the case company for more than ten years and also participated to the plant solution building as an automation specialist for several years. Thus, the researcher's level of knowledge about the study topic could be considered sufficient to ensure credibility in the study.

Validity in the study research is measuring if the selected methods, approaches and techniques actually relate to the issues have been explored. To increase the validity of this study, several measures are utilized. Firstly, the research process is designed in

detail for data collection and analysis. Secondly, the data collected from interviews are returned to the interviewees for checking and comments. Thirdly, the key-stakeholders are involved into the development, discussion and interpretations of the results several times during the study. Finally, the researcher has made all effort to avoid personal bias by involving the management to analyze, evaluate and work collaboratively on the research problem.

### **3 Current State Analysis**

This section presents the current state analysis. First, it gives an overview of the case company and then discusses the results of the current state analysis.

#### **3.1 Overview of the Case Company and Minerals Processing Business Area**

This sub-section gives an overview of the case company and describes the role and position of the Minerals Processing BA in the case company. It also introduces the current operating model of Solution Sales in Minerals Processing BA.

The case company offers leading technologies and services for the Sustainable use of the Earth's natural resources. The case company operates in metals and minerals processing industry and during the long history in metals and mining industry have developed multiple breakthrough technologies. The case company also provide innovative solutions for industrial water treatment, the utilization of alternative energy sources and the chemical industry. Presently, the case company has a worldwide network of sales and service centres, research facilities and over 4,500 experts. The case company generated annual sales of approximately EUR 1.4 billion in 2014 and its shares are listed on NASDAQ OMX Helsinki.

The current corporate strategy in the case company was renewed and launched at 2010. The case company's strategic intent is to become the number one supplier of sustainable minerals and metals processing solutions, and to become an innovative supplier of sustainable energy and water processing solutions. The company's mission is to develop and provide technology solutions which can offer performance and life-long benefits for its customers. The main structure of the case company is shown in Figure 3.

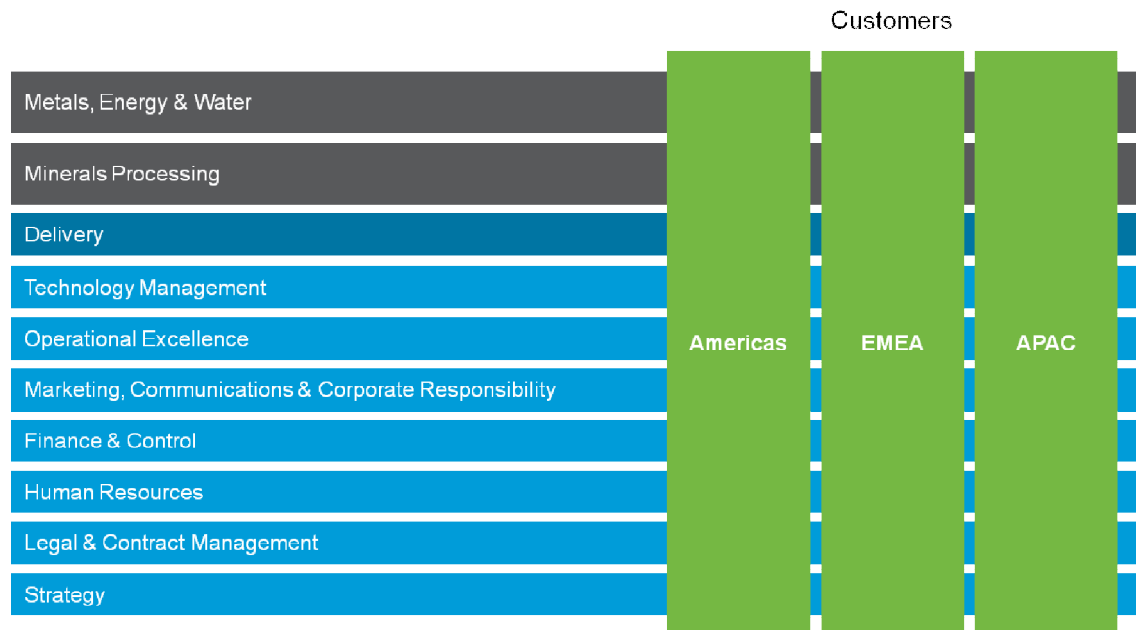


Figure 3. Main operational structure of the case company.

As seen from Figure 3, the case company's businesses are divided to two business areas (BA): Metals, Energy & Water and Minerals Processing. At the customer interface, the company operates through regions which have the main responsibility of the sales. The sales operations are coordinated and supported centrally from the business areas. The delivery is a global operative function that is responsible of the execution of the customer projects. Other global functions support the company's main operations. This study project focuses on the sales operations in the Minerals Processing BA.

The Minerals Processing BA is a business and technology owner of the minerals processing offering in the case company. The Minerals Processing consist the processing technologies needed for concentrate production. The Minerals Processing technology portfolio contains wide range of minerals processing equipments for base metal, precious metal, iron ore, chromite and ilmenite ore, various industrial mineral and smelter slag applications. The range of the minerals processing equipments consist comminution equipments for grinding the ore and preparing it to the beneficiation, beneficiation equipments for separating the valuable mineral particles from the tailings and the equipments for dewatering of the valuable minerals and the waste material.

Minerals Processing business area is operating through matrix organization. The operational structure of the Minerals Processing BA is shown in Figure 4.



Figure 4. Operational structure of the minerals processing business area.

Figure 4 illustrates the operations inside the Minerals Processing BA that are divided to three business lines (BL): Comminution, Beneficiation and Dewatering. Together these BLs creates the total technology portfolio needed for minerals processing. Figure 4 also shows the shared operation inside the Minerals Processing BA.

The Business Lines are profit and loss responsible units. It means that these Business Lines are managing the business by directing and guiding the equipment sales operated in Regions. Each BL has also a role in the total minerals processing solution sales as a one of the shareholders in each case. Consequently, there is not a single unit having responsibility of the total concentrate production solution business. The sales operation in Minerals Processing BA is responsible for developing sales operations and tools as well as doing the total concentrate production solution sales. Products and Technologies function is responsible of developing product development methods and tool as well as offering product development services for BLs. The Delivery function's responsibility is the project execution of the customer delivery from pre-engineering through purchasing operations to construction and commissioning of the plant or equipment. Other functions are supporting daily operations of all above mentioned operative functions. The case unit of this study is a part of the Sales operation in Minerals Processing BA.

### 3.2 Operating Model in Sales

As mentioned earlier, the case company updated its strategy in 2010. The transformation process from equipment manufacturer to solution provider was launched. Accordingly, the company reviewed its strategy at the end of 2014 and introduced a new stra-

tegic program for 2015, where the company clarified its message to become a more customer-focused company. The main target for the strategic program was to improve profitability by increasing sales. One of the main objectives in increasing sales was to clarify the roles and responsibilities, simplify the sales process and enable the decision making related to sales cases at the lowest possible level. The company believes that these improvements together with better sales prioritization and improved sales management increase the effectiveness of the sales efforts.

Following this upgrade, the company published its new structure and operating model to bring itself closer to customer and make them more responsive and faster in sales. The target of the new operating model is to clarify the roles and responsibilities of Regions and BA's in sales and delivery. Another, remarkable change in the new operating model is that highly productised equipment and plant solution models are separated and follows different practise. These changes together with the transformation process created great need to improve the operating model also at operative level of the company's proposal management function. The new operating model of Sales is shown in Figure 5.

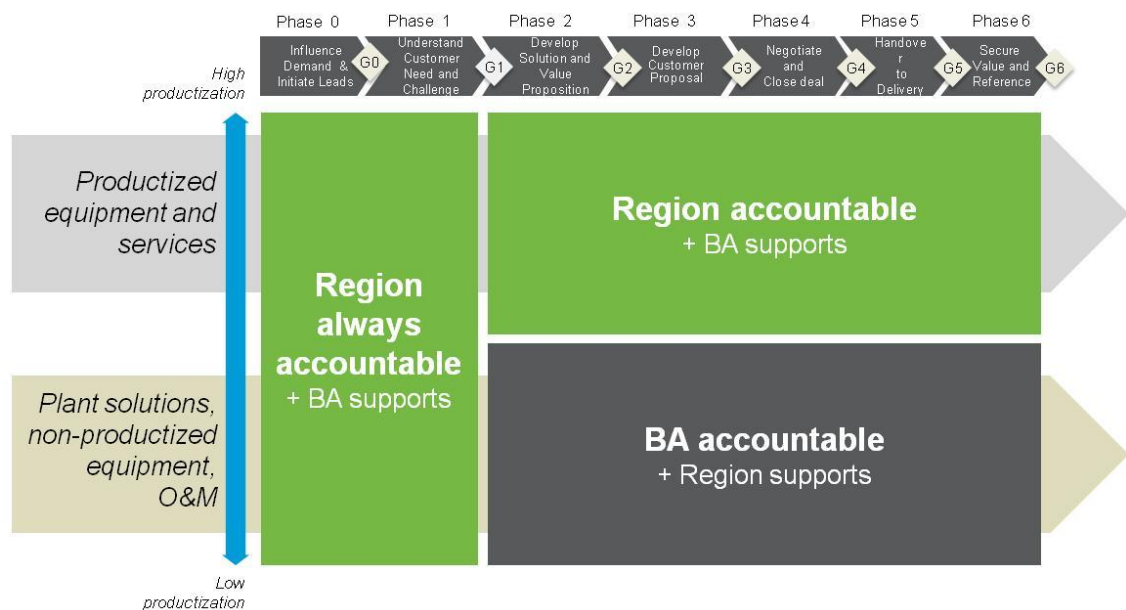


Figure 5. Sales operating model of the case company.

As shown in Figure 5, the new sales operating model consists the total offering of the case company. On the upper part of figure 5, the sales process is presented on a general level. It consist step by step process for building a customer proposal. Starting

from identification of possible customer and forwarding to the delivery of the offering. The Figure 5 also shows the responsibilities related to different types of the offering. Basically the offering is divided to two streams: Productized equipments and services and non-productized equipments and services. The plant solutions are considered as non-productized items. On more detailed level, the sales process is divided to three streams which are built according to the type of the offering: Solution Sales, Equipment Sales and Service Sales. All of these three streams are following same steps by step process that is shown in the general level only the detailed actions are different within the process. The logic is that the detailed process is selected based on the customer need. However, there is a contradiction in this logic since the customer need is not identified and verified until the phases 1 and 2.

### 3.2.1 Plant Solution Sales

Plant Solution Sales is a rather long process which typically takes years to become reality and finally the contract is signed. The life-cycle of solution sales consist various steps that require different kind of information and cost estimations which are refined during the life-cycle of the sales case. The closer to the realization the sales case come, the more precise the estimations need to be provided. From provider's perspective, the life-cycle of the solution sales consist typically three phases: indicative proposal, budgetary proposal and firm price quotation. (Data 1, E-G)

First, the process starts with *the indicative proposal*. The information from the indicative proposal is typically needed by the customer for starting the financing planning. Typically, the customer need and timing varies a lot by the case and the response time is very short. Since there is a variance in the cases and delivery time is short, the detailed process for the indicative proposal is difficult to define and typically the indicative proposals need to be done by the Sales Manager. In some cases proposal management organization is used, if there is a right skills in place and available. In either way, the estimations are done by personal estimation tools based on reference data from previous cases. Since the personal tools are used, the tacit knowledge related to the estimation of the plant solution is not disseminated. Recently, the proposal management group has faced this in reality since several senior estimators/specialists have retired. At the moment, there are no competent estimators available in the proposal management group. Consequently, this means that in the near future, the indicative proposals need to be done by the sales managers themselves. (Data 1, D)

In second phase, *the budgetary proposal* is done. Budgetary proposal is a more precise estimation done by the Proposal Management. The budgetary proposal is needed by the customer to build evidence for the financier and to get the financing for the investment. This phase requires a considerable engineering effort and a participation of several different specialists from different organizational units. (Data 1, D)

Finally, comes *the firm price quotation phase*. This phase is executed in a same way as the budgetary proposal but on the most detailed level. In this phase, also the sub-suppliers are participating to the process by giving their cost information for particular scopes. This phase targets to the contract between the supplier and the customer. (Data 1, D)

### 3.2.2 Plant Solution Sales Process and Customer Proposal Building

In case of the plant solution sales, the business area is a responsible party in the case company. Inside the business area, the proposal management function is accountable for executing the customer proposal building. Figure 6 illustrates the solution sales process and describes the content of the customer proposal building phase. (Next page)

As shown in Figure 6, the building of the customer proposal happens in phase 3. The sales strategy and initial concept are build in previous phases without the participation of the proposal management or the specialists. The phase 3 is mainly for preparing the proposal documentation. According to the current process, the phase 3 is the scope and responsibility of the Unit in this study.

The case company has also developed detailed procedures to help people to act according to the process in execution of customer proposal development (Phase 3). These processes are available in case company's intranet for all employees and are the official processes used in the case company. The detailed process of the phase 3 is shown in Figure 7.

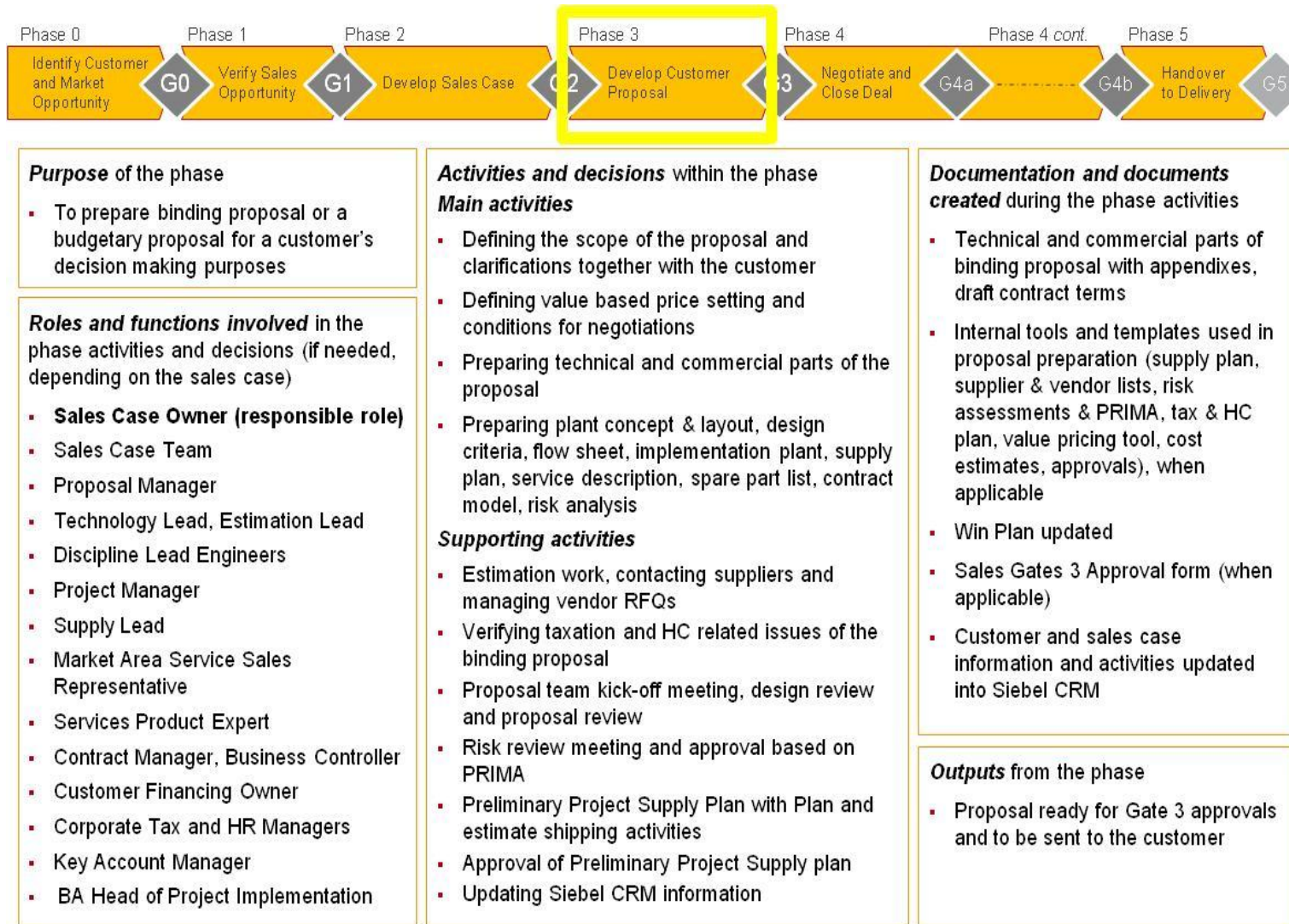


Figure 6. Solution sales process and the content of the customer proposal building process.



As shown in Figure 7, the detailed process of the customer proposal creation (Phase 3) follows and guides the internal procedure of the customer proposal development in the case company. It defines different tasks of each role and gives guidance of the tools and templates required in the process. The process starts by inviting the proposal management to the sales case. The sales manager handovers the sales case and the customer data to the proposal manager for building the customer proposal. At the same time the sales manager informs the customer of the bidding. The proposal manager arranges required resources for solution building, set up the internal kick-off meeting and the customer solution proposal building process is started. After the kick-off meeting, the plant concept, project implementation concept and preliminary supply plan are prepared. The customer value input is directed to review the design. After reviewing the design technical solution and estimates, the customer proposal documentation is finalized. The finalized proposal is validated and forwarded to the internal approval before sending to the customer.

The detailed process is the implementation guidebook for practitioners in the building of the plant solution proposals. According to the current process, the practitioners are not conducted to the customer solution building in the early stages and the practitioners are not invited to the customer interaction. The solution building is based on the information from the sales manager. The customer value input is shown in the process, but it is requested from the customer before presenting the solution for them.

### 3.3 Role of the Proposal Management Unit

The building of the budgetary proposal and the firm price quotation is the responsibility of the Proposal Management unit. The work usually starts from the reception of the inquiry or initial data which is provided by the sales manager with a request of resources. The inquiry may vary from an official request for quotation to the interpretation of the customer needs by the sales manager. Since receiving the inquiry, the head of proposal management is nominating a proposal manager for the case and starts preparation work. If the expected proposal monetary value exceeds certain limit, the project manager from the delivery organization is nominated to manage the proposal creation. Typically, the sales manager is the only contact point and is offering the initial data from the customer and from the phase 2 decision point. Often, this data is limited and e-mails are used rather than discussions.

In some cases, the sales manager requests to organize the kick-off meeting and recommends the participants for the meeting. Sometimes, an unofficial and preliminary proposal meeting is held between the sales manager and nominated proposal manager before the actual kick-off meeting. This can be considered as the first part of the kick-off meeting. In this meeting, the roles and responsibilities between proposal manager and sales manager is agreed. The roles and responsibilities of the proposal and sales manager are agreed case by case depending on the skills of the persons in question. The case is also be created to the proposal management system and pre-conditions, like case ID, structure and templates, of the proposal project are created.

The proposal manager organizes the kick-off meeting and ensures the allocation of resources. Resources are nominated from the shared specialist pool of the delivery function in collaboration with supervisors of the pool. If possible, the sales manager's recommendations in nominations are followed. The target of the kick-off meeting is to identify the scope and schedule as well as agree the practices and share tasks of the particular proposal creation project. Typical participants for the kick-off meeting are Proposal Manager, Process Metallurgist, Engineering Manager, Electrical-Automation Specialist and Chief Estimator. If possible, the sales manager is also participating for introducing the case.

After the kick-off meeting, each specialist conducts and follows up their own part of the actions according to their own instructions. The proposal manager acts according to the agreed role and personal skills by coordinating the project and resources, giving technical support and preparing contractual documents agreed with the sales manager. The proposal manager is often acting also as a reviewer of the technical design and documentation by checking inconsistencies and overlapping of the separate parts of the design and documentation. In general, the proposal manager is responsible of quality of the proposal and delivery on-time.

During the proposal creation, the review meetings are organized mostly by the proposal manager and occur regularly or as required basis. The review meetings are held to agree of possible changes and to discuss all the problems related to proposal activities.

Before the proposal is can proceed to the risk review, the final proposal review is done. The appendices and estimations are finalized and modified to ensure a unified appear-

ance. The estimations are finalized by the chief estimator and proposal text is reviewed by the proposal manager. During the final proposal review, the estimation is confirmed and the final modifications to the proposal text are done. After the final proposal review, the proposal is delivered to the sales manager for risk and margin review and finally for the delivery to the Customer. In this phase the proposal management's role ends and resources are released for next tasks.

Summing up, the role of the proposal manager in the process of the plant solution creation may vary from managing all the activities related to proposal creation down to writing the commercial proposal only. If a project manager is nominated, the proposal manager may act as an advisor for the best practice in the proposal creation.

### 3.4 Strengths of the Current Process

The current state analysis indicates that the practitioners of the plant solution proposal creation are fairly satisfied with the current process. However, the process was felt as quite complex and the decision making procedure as not clearly indicated. A deeper analysis of the current state also reveals that not all the practitioners were trained for the process. The process training has been addressed only to the sales and proposal management groups. The specialist groups were not trained either the specialists had learned the process independently from the company's intranet.

Despite the lack of the training, practitioners felt that collaboration within the solution proposal team is always good even if the people are changing from case to case. The skills and competences of the team members were also considered as good and the process is supporting the work.

### 3.5 Weaknesses of the Current Process

The current state analysis results that the current sales process is not fully supporting the solution sales operations in the customer proposal creation phase. The current sales process starts from the assumption that the sales opportunity and the type of the offering are clear. As soon as the type of the sales opportunity is identified, the process of the customer proposal creation is selected accordingly. The process is build to guide the case company's internal process of the customer proposal development. (Data 1: C-D) It does not consider the real customer's investment project process fully enough

and is *not supporting the life-cycle of the sales opportunity*. Typically, the challenges appear when the sales opportunity transforms from equipment to a solution or vice versa during the life-cycle of the solution sales and the decision making responsibility moves for another party inside the organization. These changes typically cause challenges for the decision making and result in a weak sales strategy which is occurring as *unclearities in the roles and responsibilities* in the later stages of the process, at the customer proposal creation. (Data 1: E, G and I)

As mentioned in the previous section, the current process lacks clarity in roles and responsibilities at both personal and function levels. Firstly, the *ambiguity* is revealed in business *decision making and target setting*. The practitioners felt that since the case is passed to the customer proposal creation phase (phase 3), the case lacks clear strategic decision and target setting. According to Sales Manager (Data 1: E):

*“Very seldom we will evaluate what we should really offer?”*

Since these key metrics are not clearly defined, all plant solution proposals are following the same approach and the company’s plant solution expertise cannot be utilized for differentiating from competition. The proposal team is not fully aware if the win plan is based on equipment- or customer-orientation. The current process is offering a tool for defining the win plan and competitive strategy, but according to the current practice, it is mainly used for sharing general information of the customer. In-depth data of the customer’s operations is typically missing, or it is provided in loose e-mails and in-depth discussions are not happening. The second weakness that relates to the roles and responsibilities is the lack of prioritization. The customer proposal team does not have any prioritization and all proposals are considered as highly important. (Data 1: E, G and I)

Secondly, this role and responsibility ambiguity is causing *resourcing challenges* as well as causing *tension* between product lines and the plant solution proposal creation team. Since there is no prioritization, it is difficult for supervisors of specialist pools to direct best resources to the right cases. Poorly defined targets are leaving the business decision making responsibility to the single individuals in proposal creation team. According to department manager (Data 1, J):

*“Typically, the resource requests come with a very short notice and without any kind of prioritization. Therefore, it is impossible to organize best resources to most important cases.”*

In some areas, this is also causing tension between equipment and plant solution responsible persons and the best possible customer solution is not always possible to create. (Data 1: F, I and J)

Thirdly, there are some *un-clarity in the roles and responsibilities* between sales manager, proposal manager and project manager. The practice varies mainly by a monetary value of the case. In a low monetary value cases, the project manager is not involving to the proposal creation. The project management costs and practices are left for less attention which can be redounding as un-expected costs in delivery. In high monetary value cases, the proposal manager is replaced with the project manager. Typically, these cases do not follow the same procedures and practice as low monetary value cases and cause even more uncertainty and un-efficiency in proposal creation. Since the project manager is in place, the project management costs are considered. Due to these variations in involvement of the project manager, the project management costs vary case by case, there is no continuity in estimations and estimation tools cannot be kept up to date. According to department manager (Data 1: J):

*“In case the proposal manager is in place, the jobs are done according to the process. In case there is a project manager in managing the proposal work, the practice is different.”*

Depending on which type of setup is chosen, the role of sales manager is also changing and is sometimes causing un-expected workload for the sales managers. (Data 1: F, I and J)

In the current solution sales process, the customer interface is controlled by the sales manager. The sales manager is typically the only person that interacts with the Customer. Typically, the proposal team is not participating to the customer negotiations and is not directly interacting with the customer. The collection of initial data and detection of customer value is a job of the sales manager and is based sales manager's own experience and interpretation from the customer message. The collected information is then used in phase 2 for building customer value proposition. The proposal manage-

ment is not participating to phase 2. Currently, phase 2 is not providing enough information and clear definition of the targets that could be used in building proposals which would fulfill its purpose in eyes of the Customer. *Late-involvement of the proposal team* with a practice of using mainly win plan tool and e-mail for information sharing is causing challenges for the proposal team in understanding the customer value proposition. Typically, phase 2 information is only focusing to the process technology and equipments. Customer values, which are not directly related to the technology is not considered. Customer values related to implementation of the delivery and construction is often overlooked and the credibility and differentiation of the plant solution is weak. Other service related customer values are also typically considered separately from the plant solution. This is also weakening the credibility of the plant solution.

In the plant solution proposal creation, the proposal team is collected from the shared specialist pools. Supervisors of the specialist pool are nominating the specialist for the proposal cases. The nomination is depending on a current workload and availability. Often, the supervisors themselves need to act as specialists in the customer proposal creation projects. These pools are sharing their time between the customer proposal creation and the delivery projects. The delivery projects are their main job and the working hours of the specialists are normally planned fully for this purpose. Consequently, this means that the delivery work is always getting higher priority and the customer proposals are done whenever there is time left after the delivery project activities. Often the time for the customer proposal creation is scattered and it is impossible to focus to do the work well enough. Due to time in use and the skills and the experience of the person in question varies, also *the quality and performance* varies. The practitioners also pointed that more often there are same people in the proposal team better is the efficiency and quality of the plant solution proposal creation.

Next, since the people are changing also *estimation tools and methods* are changing. Personal estimation tools are often used. Some technical disciplines might have common tools but these are not open for everybody. Typically, only the summary of the estimation is provided for the proposal manager. If there are several departments or units involving to the proposal creation, it is impossible for the proposal team to align and check overlapping the estimations. (Data 1: E, F and G)

The same challenge relates to *the internal pricing policy*. The proposal team's role is to create the plant solution from several sub-scopes. Since the cost structure of the sub-

scopes is not transparent and only summaries are used, the proposal team and sales manager has no tools to optimize costs and margin in the plant solution proposals. This is resulting extensively high sales price in the plant solution proposals and reduces the possibilities to act in sales. (Data 1: G)

Finally, the current process of the plant solution creation is having some limitations in consideration of *the delivery* as part of customer value in the solution sales. The same limitations realizes in the project supply planning in the proposal creation and estimation phase. Careful planning of engineering, purchasing and manufacturing is not done in the proposal creation. Additionally, possible utilization of the local or low-cost operations in engineering, purchasing and manufacturing is not well planned and the benefits cannot be realized in the estimation.

### 3.6 Key Challenges of the Current Process

The current state analysis of the plant solution proposal building in the case unit demonstrated both strengths and weaknesses in the current process. As obvious achievements of the Minerals Processing BA, such factors can be named as a long tradition in equipment manufacturing business and in following a product-dominant logic of its operations. Moreover, the equipments are highly productized and business operations are stable. The Minerals Processing has a good global network for providing various types of services for its installed base. However, a new strategy and transformation to the plant solution business are causing challenges for the solution sales. These challenges also appear in the solution sales as problems to create competitive plant solutions and to develop customer proposals within a reasonable time.

The current state analysis focused on studying these challenges from the point of view of the customer proposal creation. The customer proposal creation is the third phase in the process of plant solution sales. In the previous phases, the sales opportunity is verified and the decision of developing the customer proposal is done. The current state analysis indicated that some of the challenges in customer proposal creation are initially build and *inherited* from the previous phases. Among them are the poor or non-existent *business decisions* and *sales strategy* which cause uncertainty for the targets in the customer proposal creation. The lack of *prioritization* of the sales cases was also considered as a concern. This missing prioritization of the sales cases resource management challenges since lot of effort is used also for less important cases.

The analysis also showed some *responsibility* issues in the current process. The management of the process of customer proposal creation was unclear. According to Proposal Manager (Data 1: I):

*“Basically, the responsibility of the customer proposal management depends on the monetary value of the case. The problem comes when the value of the case is growing and project management is needed”.*

The practise varies by the monetary value of the case and is causing uncertainty of the execution procedure in the customer proposal creation.

The identification of the *customer value* in multi-disciplinary and complex plant solution scopes including engineering, purchasing and construction services was also seen as an area for concern. Misunderstanding or overlooking of the customer value leads to proposals that are not perfectly fitting to its purpose.

According to the current practise, the proposal teams are collected from the shared specialist pools. The specialists representing certain field of expertise or equipment are providing their input to the common plant solution proposal. Changing resources, technical skills and tools are resulting variation in delivery time and quality of the customer proposals. Lack of *transparency* in the cost structures of the sub-scopes provided by the specialist prevents the planning and optimization of the cost structure and margin in the plant solution proposal.

Finally, since the creation of customer plant solution is centralized, the cost information used in proposal creation is based on a local cost level. As a result, the utilization of low-cost engineering, purchasing and manufacturing is poorly considered in the current proposal creation phase. The summary of the current challenges is shown in Table 6.

Table 6. Summary of the current challenges.

No	Type of the challenge	The current challenges
1	Case company solution sales process does not follow customer's true plant investment process.	Customer view in sales process
		Prioritization of sales cases
		Roles & Responsibilities (function) in business decision making

<b>2</b>	Evaluation of an individual sales lead's solution business potential is not sufficiently analyzed.	Value quantification: Equipment or Customer orientation?
		Business decision & target setting
		Win planning according to business decision
		Use of plant delivery excellence as competitive edge
<b>3</b>	The critical stage of customer proposal creation lacks a systematic and conceptual approach.	Project practises
		Roles & Responsibilities (people)
		Common tools

As shown in Table 6, the improvement of the process of the plant solution proposal creation requires improvement in several areas of the overall solution sales process. The customer proposal creation performance can be improved by enhancing the overall sales process and by aligning the operations within the process.

A major finding in the current state analysis was related to sales opportunity verification and sales case development phases (Phase 1 and 2) of the solution sales process. The challenges to identify and evaluate the customer value and further on to define and verify sales opportunity are causing major problems in later phases. The findings from the current state analysis are shown in Figure 8.

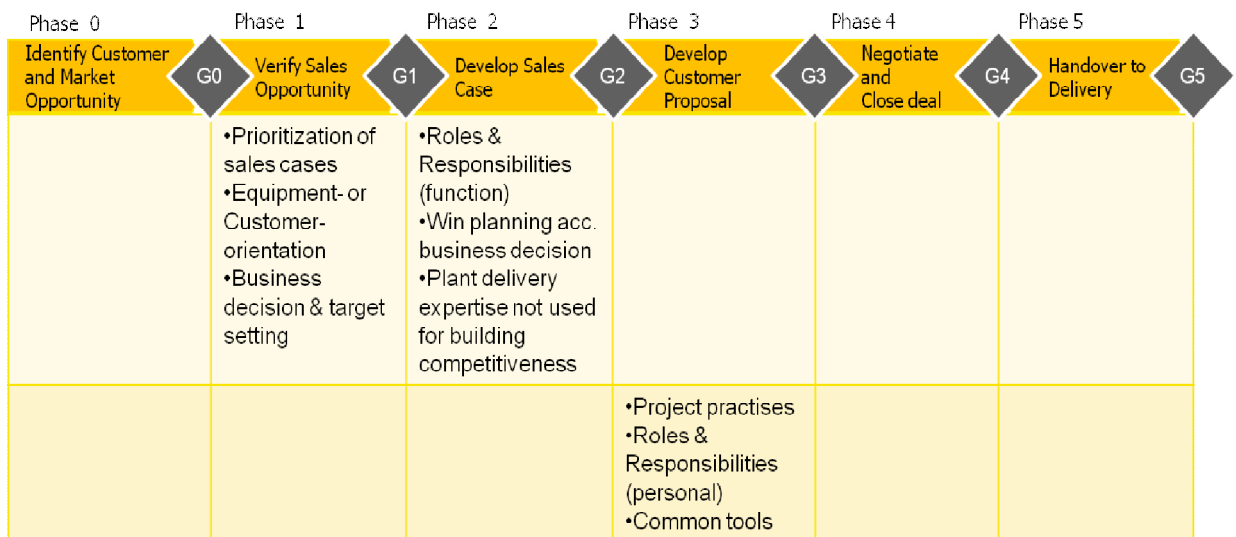


Figure 8. Findings from the current state analysis.

Figure 8 illustrates how the findings are linked to the different steps of the process of the solution sales in the case company. The challenges faced in the sales opportunity verification are generating the following challenges in the later stages. If the challenges

in the sales opportunity verification phase could be corrected, it would result in improvements in the efficiency and quality in the proposal creation and consequently in the improved competitiveness in the overall solution offering.

In summary, Table 7 illustrates the strengths and weaknesses of the case company.

Table 7. Summary of the strengths and weaknesses of the case company.

<b>Strengths</b>	<b>Weaknesses</b>
Sales process for internal purposes	Lack of customer view in sales process
Good collaboration	Unclear roles and responsibilities
Competent personnel	Ambiguity in decision making
	Ambiguity in resource management
	Late involvement
	Estimation tools and methods
	Internal pricing policy
	Quality and performance
	Utilization of the competences

Since this study focuses on improving the plant solution proposals from the perspective of the customer value, the current state analysis concentrates on the major challenge in the current operational model, namely the *weak sales strategy* or *lack of clear sales strategy*. As the findings demonstrated, this lack is caused by incapability to identify and evaluate the customer value and verify the sales opportunity and competitive factors. This selected challenge is studied more deeply in the next section.

In the following section, the case company's challenges to identify and evaluate customer value in solution business are benchmarked with the existing knowledge and best practise found from the literature.

## 4 Customer Value in the Process of the Plant Solution Creation

This section discusses the existing knowledge and best practice on solution business and identifying the customer perceived value in this type of business. First, it discusses the general understanding of solution creation. Second, it discusses the customer perceived value in solution business. The ideas explored in this section create the conceptual framework for building the proposal in this study.

### 4.1 Nature of Solution Business

Literature gives various definitions for the term “solution”. The “solution” is described for example as “integrated solution”, “customer solution”, “business solution” and “total solution”. Regardless of the terminology, all defines the solution as a bundle of products, services and software, which can solve the customer’s specific problem, and are relatively wide and complex sets of products, targeted not only technical interconnection but also on the total usage context. (Nordin and Kowalkowski 2010: 441) Storbacka et al. (2014) describes the solution as

*“longitudinal, relational processes that comprise the joint identification and definition of value creation opportunities, the integration and customization of goods, service, and knowledge elements, the deployment of these elements into the customer’s process, and the compensation of the solution provider on the basis of the customer’s use-value.” (Storbacka et al. 2014: 5)*

Literature also provides various other definitions for the term solution. Common for these definitions is the fact that all of the definitions are describing solutions as unique combinations of products and services which are created and delivered to a specific customer where the target outcome is to solve the customer’s specific problem and bring added value to the customer.

Current literature also shows that a solution has several major elements. Firstly, it involves the characteristic of both, product and service elements instead of one of these exclusively. This creates a possibility for a supplier to capture a bigger share of the business from a customer within a given specification and provides a starting point for competitive differentiation. Secondly, a solution includes tailoring to address a special customer requirement or challenge a customer faces. This requires an understanding

of customer needs as well as the limitations that forms the situation. Thirdly, solutions involve a process of the solution delivery. This includes an initial phase to identify and diagnose the nature of the customer problem. The initial phase is followed by the planning of the solution until the customer agreement is signed. Implementation of the solution and a problem-solving within the implementation is the next step, with a finalization of the project. A final element of solutions is the need to create and manage relationships with key stakeholders throughout the delivery process. (Prior 2013: 1193)

As discussed in previous sections, the solutions are broadly understood unique combinations of products and services which are delivered through complex process to build a solution to the customer's specific problem. The solutions process is often described as starting with a customer problem (Sawhney: 2006). However, the customer problem is not always clearly defined. Often, the customer does not recognize nor admit their primary problem, nor the customer knows what is needed to do to resolve it. Selling of the solutions does not start with "a formal customer's specification and detached product requirements" but rather with investment of the provider's time and effort to identify the problem, before it can be addressed. (Bonney and Williams 2009: 1033 - 1038)

Tuli et al. (2007) defines the process of solution creation as set of supplier-customer relational processes comprising the definition of customer requirements, customization and integration of goods and/or services, deployment of the integrated goods and services and post-deployment customer support. Storbacka et al. (2014), Brady et al. (2005) and Davies et al. (2007) also propose a linear four-step process for problem-solving in solution business context. Table 8 illustrates the four-step processes in the context of solution business.

Table 8. Process steps in the context of solution business.

Tuli et al. (2007)	Davies et al. (2007)	Brady et al. (2005)	Storbacka et al. (2014)
	Provide an in-depth analysis of a customer's business		Develop solutions Combining customer insight and firm resources
Definition of the Customer requirements	Identify and diagnose problems in a customer's organization	Strategic engagement phase: pre-bid activities	Create demand Creating demand and identifying sales opportunities
Customization and integration of goods and/or services	Offer solutions based on its experience of working with a number of customers	Value proposition phase: bid or offer activities	Sell solution Turning an opportunity into an order

	facing similar situations		
Deployment of the integrated of goods and/or services	Coordinate the integration of components into a solution	Systems integration phase: project execution activities	Deliver solution Securing customer value creation and firm value capture
Post-deployment customer support all of which are aimed at meeting Customer's business needs		Operational service phase: post-project activities	

As shown in Table 8, the process of the solution creation is linked to the sales and delivery activities. Tuli et al. (2007) and Brady et al. (2005) builds the framework starting from the definition of the customer needs since Davies et al. (2007) and Storbacka et al. (2014) start by identifying possible customer's and creating the customer need. In summary, the life-cycle of the solution starts before the actual sales activity and is followed with the creation and delivery of the customer solution and finally can be concluded with a longitudinal post-project services activity.

Since solutions are delivered to the customer in a form of a project, the project business is in relation to solution business as a method to deliver value-added to the customer. As defined by Artto et al. (2011);

*“This type of delivery project represents a production (or manufacturing) function in business, which generates added value for the external customer in the form of a solution that solves the customer's problems and satisfies the customer's needs.” (Artto et al. 2011: xxx)*

The customer's needs may vary greatly and each project produces unique solution. Therefore, the logic of the solution delivery business differs from the logic of repetitive, mass production of products or services, which can be named as continuous, repetitive, and seamless flows of materials, information, and money. Delivering solutions to customers' specific problems in a form of projects includes delivering added value to customers. This often increases the supplier's profitability since the customer is willing to pay more for a delivery or solution with more value. (Artto et al. 2011) Projects delivered to customer are connected to the customer's investment projects. Figure 9 illustrates the linkage between supplier's delivery project and customer's investment project.

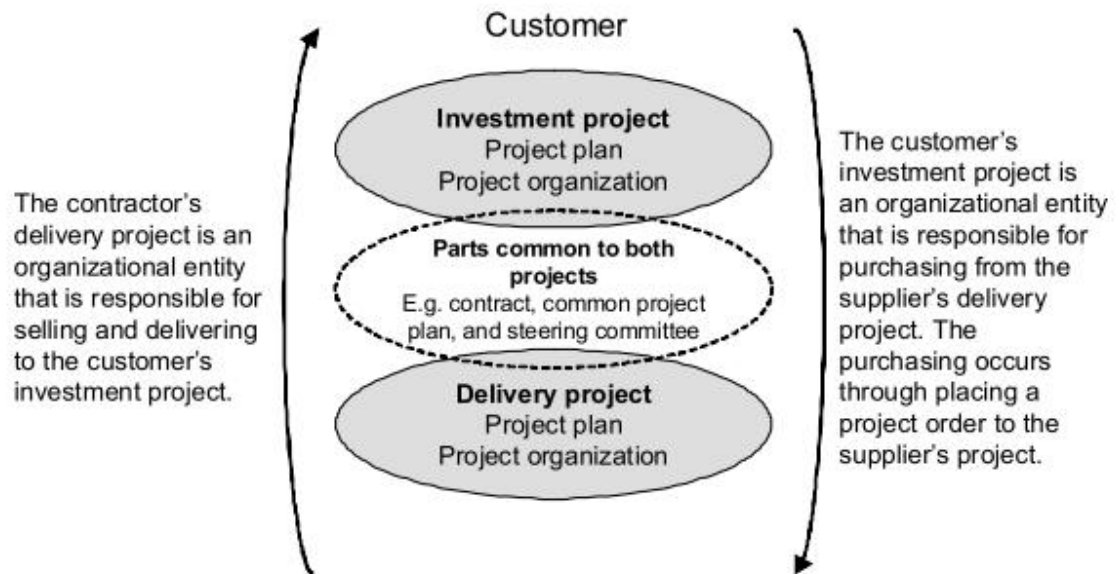


Figure 9. Investment project and delivery project: two different projects to realize the customer's Investment. (Artto et al. 2011)

As shown in Figure 9, the customer's investment and supplier's delivery projects are interconnected. The investment project is carried out by the customer, who invests to the delivery project and the solution that result from the delivery project. To make sure that the customer captures the value from the delivery project, the customer directs and monitors the progress of the delivery project. To able to do that, the customer establishes its own project with its own project schedule, appoints a project manager, and sets up its own project organization. The solution supplier has a delivery project perspective regarding the customer's investment project. The solution provider builds and delivers the solution ordered by the customer in the form of a delivery project. The outcome of the solution provider's delivery project is received by the customer's investment project. The solution provider is interested in creating value for the customer and the price is set to serve as compensation. (Artto et al. 2011)

In summary, the solution business makes a longitudinal and relational process of creating added-value to the external customer. It is perceived as a continuous process where the customer value is created together with the customer and supplier. However, there can be identified four main steps; pre-sales, sales, delivery and post-delivery services where the customer requirements and needs may vary. Since the customer requirements and needs may vary from case to case and within the case, the customer value needs to be identified and analyzed separately in each particular case.

## 4.2 Customer Perceived Value in Solution Business

Traditionally the literature has defined the value in relation to cost and quality where the value is calculated as exchange between quality and price. This has been economist approach to the value where the price is considered as equal to the quality. However, the extensive research has shown that the value in service business is not only objective. It has a link to the quality of the interactions between the supplier and the customer. The quality of the interactions has an impact to the customer perceived value. (Grönroos 2011: 240 – 245)

The customer perceived value can be also measured through benefits and sacrifices. Ulaga and Chacour (2001: 527) defined the value as of an exchange between benefits and sacrifices the customer perceive in a supplier's offering. The total customer's benefits consist of functional value and mental value, while the total customer sacrifices consist of economical and non-economical customer costs (Khalifa 2004: 662) such as time and effort needed to purchase and consume the product and/or service. When studying the customer value (CV), Anderson and Narus (1998) created a common definition and framework for the customer value in business markets. Anderson and Narus (1998) says:

*“The value in business markets is the worth in monetary terms of the economic, technical, service, and social benefits a customer firm receives in exchange for the price it pays for a market offering”. (Anderson and Narus 1998: 54)*

The benefits are ultimate benefits, where any costs that the customer has to pay in order to get the benefits, apart from purchase price, are included. The price is what a customer pays a solution provider for its market offering. (Anderson and Wynstra 2010: 31-32) In industrial context, the customer benefits are the benefits that the customer receives in exchange for the cost the customer has to pay in order to purchase and use the product. (Lapierre 2000: 123)

Grönroos (2000) defined the customer perceived value from three different angles. He says that:

*“Analyzing the customer value from all of these angles leads to a better understanding of how the customers perceive the value, which factors*

*contribute to the value and how the value can be managed.” (Grönroos 2000)*

Grönroos formulated the customer perceived value to three equations:

$$CPV1 = (\text{Episodebenefits} + \text{relationshipbenefits}) / (\text{episodesacrifice} + \text{relationshipsacrifice})$$

$$CVP2 = (\text{Coresolution} + \text{additional services}) / (\text{price} + \text{relationshipcost})$$

$$CVP3 = \text{Corevalue} \pm \text{addedvalue}$$

In Grönroos's (2000) definition the core value is the benefits of a core solution compared with the price paid for that solution. The added value is the benefit received from the additional services compared with the costs that realize over time in the relationship. The relationship includes both single customer-supplier purchasing interaction and continuous interaction. The added value can be both positive and negative. Negative added value can be a result of complicated systems, non-user friendly technology, unfriendly behavior or unskillful employees, late deliveries, incorrect invoices, poorly handled complaints, delayed maintenance of equipment, complicated equipment documentation, long queues to get served, etc. If those operations are not handled as services, but as bureaucratic routines or are targeted only on internal efficiency, their impact on customer perceived value is normally fatal. Delay in delivery or maintenance, lack in proper support, or unfriendly and untrustworthy personnel and lack of interest in service recovery can easily destroy an excellent core value. (Grönroos 2000: 140-142)

Thus, in solution business the customer value need to be analyzed over the whole life-cycle of the solution creation. However, the customer value is not created in the single encounter, but in the interactions during the life-cycle of the solution creation. These interactions build the framework for the relationship between the supplier and the customer. The benefits and sacrifices need to be identified separately for the single encounter and for the longer term relationship, but together these builds the total customer perceived value.

#### 4.3 Identifying the Customer Perceived Value in Solution Business

The designing and delivering of solutions has grown in importance in business markets. Traditional manufacturers have moved into service and customer solution business to solidify their positions in increasingly competitive markets and grow their reve-

nues and margin. (Ulaga & Reinartz 2011: 5) Capability to design and deliver solutions has created ability to provide added-value to the customers. However, it is challenging to identify customer need and perceived value from the supplier perspective and major part of the supplies solutions are not creating the best result. (Tuli et al. 2007: 1-17)

However, value is perceived emotionally by customers. Customers are not homogeneous and therefore the same product can create different values for different customers segments. Previous research on organizational buying behavior indicates that various people in the customer organization are contributing to the purchasing process. Additionally, the number and positions of the people involved in the purchasing process may vary across customer organizations. These people in the customer's organization also perceive the value of the solution provider's delivery differently. Therefore, it is important to identify and evaluate the value perceptions of all key informants involved in the purchasing process. Such a multiple-informant approach is identified to be more trustworthy by far than single-informant studies. Moreover, within the solution provider's organization, opinions of how the customers sees the solution provider's products differs among functional areas, i.e., general management, marketing and sales management, salesmen or customer service personnel. Results of the difference in the value perceptions between customers and suppliers and even inside these organizations, identification and bridging identified gaps become critical steps in value delivery. (Ulaga & Chacour 2001: 529) Therefore it is important for companies identify and focus on drivers that create value for the customers in order to build a competitive advantage. (Lichtenthal et al. 1997: 224)

As indicated in previous sections, the identification and evaluation is challenging and it has to be analyzed over the whole life-cycle of the solution. Since the life-cycle of the solution includes steps where the benefits are obtained in exchange in the delivery phase and experienced in the use phase, the customer perceived value needs to be analyzed from both perspectives.

#### 4.3.1 Metrics for Customer Perceived Value

In the solution business the customer value can be perceived in various ways. Different people in different positions in the customer's organisation can perceive the value differently within the same solution. Since, the environment is complex the companies need to be able to identify value drivers which is affecting to the customers reflections

of the value in the delivered solution. Previous research provides good knowledge of the value drivers which can be used for identifying the customer value in solution business.

In his study, Lapierre (2000) researched customer perceived value in the business-to-business services marketing field. He defined the customer value in terms of benefits and sacrifices, where the customer sacrifices are the overall economic and non-economic costs the customer invests or gives to the solution provider in order to finish a transaction or to sustain a relationship with a solution provider. The time/effort/energy and conflict are considered as non-economic costs invested by the customer to get the products or services or to establish a relationship with a supplier. (Lapierre 2000: 123) He combined product, service and relationship based drivers and created totally 13 value-based drivers, which influences to the total customer perceived value in business-to-business service field. Lapierre's CPV drivers are shown in Table 9.

Table 9. Customer perceived value drivers (Lapierre 2000)

<b>Value-based driver</b>	<b>Relation</b>	<b>Benefit/Sacrifice</b>
Alternative solution	Product	Benefit
Product quality	Product	Benefit
Product customization	Product	Benefit
Responsiveness	Service	Benefit
Flexibility	Service	Benefit
Reliability	Service	Benefit
Technical competence	Service	Benefit
Supplier's image	Relationship	Benefit
Trust	Relationship	Benefit
Supplier solidarity with the customer	Relationship	Benefit
Price	Product and Service	Sacrifice
Time/Effort/Energy	Relationship	Sacrifice
Conflict	Relationship	Sacrifice

As shown in Table 9, ten of the drivers are defined as benefits and three as sacrifices. Only three of the drivers were related to product. Lapierre's study resulted that a value proposition is much more than a trade-off between product quality and price. Even if the price is an important driver in the value proposition, other drivers seems to be more important. Moreover, the product quality contributes the least to the value proposition. These findings highlights that value is more than product quality and price. Therefore, it is important for companies to understand of which drivers are the most important in the eyes of the customers. (Lapierre 2000: 130)

Since the importance of the intangible value drivers in the business-to-business markets is significant, these value metrics are playing very important role in the solution business as well.

#### 4.3.2 Financial Customer Value Drivers in Solution Business

The customer's perceive the value also in the usage of the solution. Therefore it is important to take in to account the financial values that the customers perceive in the usage of the solution. Financial values relates to the benefits that the customer perceive during the use of the solution.

Storbacka and Pennanen (2014) identified four categories for the financial customer value drivers. Figure 10 illustrates the customer value drivers identified by Storbacka and Pennanen.

Increased revenues	Lower costs	Less tied-up capital	Lower risks
<ul style="list-style-type: none"> <li>• New customers</li> <li>• New markets</li> <li>• New products</li> <li>• Higher volumes</li> <li>• Higher prices</li> <li>• Higher market share</li> <li>• Higher customer share (share of customer's purchases)</li> <li>• Shorter time-to-market</li> <li>• Higher quality</li> </ul>	<ul style="list-style-type: none"> <li>• Lower material consumption</li> <li>• Fewer man-hours</li> <li>• Less tool wear</li> <li>• Increased yield</li> <li>• Lower material costs</li> <li>• Less scrap handling</li> <li>• Fewer product defects</li> <li>• Less planned downtime</li> <li>• Lower maintenance costs</li> <li>• Less space needed</li> </ul>	<ul style="list-style-type: none"> <li>• Less machinery</li> <li>• Less space needed</li> <li>• Longer machine lifetime</li> <li>• Shorter cycle-times</li> <li>• Less inventory and WIP (work-in-process)</li> <li>• Decreased need for modernization investment</li> </ul>	<ul style="list-style-type: none"> <li>• Lower risk for scrap</li> <li>• Less unplanned downtime</li> <li>• Lower risk of production delays and penalties</li> <li>• Lower risk of inventory obsolescence</li> <li>• Less risk in metal - price fluctuations</li> </ul>

Figure 10. Financial customer value drivers (Storbacka & Pennanen 2014: 67).

As shown in Figure 10, the financial customer value drivers include four categories: increased revenues, lower costs, less tied-up capital and lower risks. The drivers identified to each of these categories are related to operational activities and costs of the usage of the solution. The drivers in this approach are the customer's financial value outputs that the customer gets when using the solution. (Storbacka & Pennanen 2014) As indicated in Figure 10, these financial value outputs in the plant solution business

can be for example higher quality of the product that the customer produce or less man-hours to be used in order to make the production.

#### 4.3.3 Intangible Customer Perceived Value in Solution Business

The solutions are delivered to the customer as a form of a project. The project is a service which enables the delivery of the solution through actions. These actions consists intangible values which are impacting to the total customer value in the solutions.

Prior (2013) investigated the linkage between supplier activities and customer perceived value as this relates to complex industrial solution delivery processes. He identified four major categories of activity as important sources of intangible customer value in complex industrial solutions. Table 10 illustrates the linkage between supplier's activities to the intangible customer perceived value.

Table 10. Supplier representative activities and customer perceived value (Prior 2013: 1199)

Activity Category	Sub-activities	Primary forms of CPV	Type of CPV
<b>Communication</b>	Information management	Efficient time usage	Functional
		Trust in ability	Social/emotional
	Expectation management	Reduced customer anxiety	Emotional
<b>Planning</b>	Solution-specific	Delivery efficiency	Functional
		Professional execution	Social/Emotional
	General	Delivery efficiency	Functional
		Trust in ability	Social/Emotional
<b>Risk Management</b>	Risk Anticipation	Reduced customer anxiety	Emotional
		Preventing implementation problems	Functional
	Problem Solving	Reduced customer anxiety	Emotional
		Getting the project back on track	Functional
	Flexibility	Allowing changes to project scope	Functional
		Relief of not having to start from scratch	Emotional

<b>Coordination</b>	Human resource Allocation	Task execution	Functional
	Budget allocation	Task execution	Functional
	Other resource allocation	Task execution	Functional

As shown in Table 10, the customer representatives perceive the value of the supplier activities in social, emotional and functional terms. The customer perceived value is categorized to four activity categories: communication, planning, risk management and coordination. (Prior 2013: 1199)

Prior's (2013) study shows that *Communication* has a role in providing emotional, social and functional benefits. It occurs through information and expectation management. The information management supports in decision-making and relationship development. Information management contains the methods used to make sure that a key stakeholder gets required information in a correct format and at a right time. Expectations management focuses on managing client behaviors and attitudes towards the project. Basically, expectation management is about providing adequate information that creates a feeling of assurance. It often realizes as a risk plan but occurs more through individual conversations. (Prior 2013: 1197)

*Planning* relates to the project delivery. It includes solution-specific planning and a wider number of company-level planning activities. In complex industrial solutions, a clear timeframe for the completion of solution-specific milestones encompasses. This is typically materialized as a project plan. Additionally, the planning activity is about making sure that the organization is robust enough for the project delivery. This includes the recruitment, training and performance management of personnel, the maintenance of appropriate corporate infrastructure and processes, as well as the development of relationships with network members. These processes form a general approach to the company's self-management. (Prior 2013: 1197 – 1198)

*Risk management* involves the identification, assessment and prioritization of current and potentially problematic issues. Risk management concentrates especially on the identification and mitigation of issues that can harm successful project delivery. Risks can occur through the characteristics of the product or system, its integration with other pre-existing systems, and the implementation of the project. A main element of the planning and communication functions is to make sure sufficient risk management. This contains the creation of the risk management plan. The risk management contains

three elements: risk anticipation, problem solving and flexibility. Firstly, risk anticipation requires an understanding of the nature of the project with an expectation that some problems are realized during the project delivery. This expectation that some of the problems realize enables a plan to minimize any resulting damage or to take advantage of the potential benefits. Secondly, problem solving involves defining appropriate methods to handle unexpected issues. Problem solving requires an understanding of the problem within its given context. Problem solving allows the project to be prepared for unexpected situations. Lastly, the flexibility makes possible to adapt to the new circumstances and issues as these happen. This realizes as changes to the timeframe requirements, budget availability and resource requirements. It also includes alterations to the project governance processes, the emergence of the new company directions and the re-evaluation of project goals. (Prior 2013: 1197 – 1198)

*Coordination* includes the dynamic allocation of human, budgetary and other resources required to complete the identified tasks. Coordination is a process of managing the allocation of the specific resources to complete the project tasks in a real time. It includes the organizing function to reach the desired goals. Coordination realizes the planning and it happens in real time. (Prior 2013: 1198)

Prior's study highlights the influence of the activities of the supplier representatives to the customer perceived value in complex industrial solution delivery.

#### 4.4 Customer Value Quantification in Solution Business

Successful adaptation of customer value in company's offering requires an understanding on customer value assessment which quantifies the impact of a supplier's offering to customers' costs and returns (Keränen and Jalkala 2014: 79). The main purpose of value quantification is to demonstrate to customers the provider's knowledge of their businesses and its ability to provide solutions that help customer organizations improve their business outcomes and, ultimately, their shareholder value. Quantifying value is also necessary for final decision-making in situations where the customer is already convinced about the technical benefits of the solution, but requires decisions to be based on financial projections. (Storbacka et al. 2014: 54)

Value quantifications are often based on several assumptions, including those relating to the logic behind the calculations. Making these assumptions transparent and dis-

cussing the solution's impact on a customer's business are often more important persuaders than the exact figures. Involving the customer in the value quantification process as much as possible is therefore important. But getting customers to open up their internal financial figures so that the firm can more accurately quantify benefits requires a good level of trust between customer and firm. (Storbacka et al. 2014: 56)

#### 4.4.1 Customer Value Audit (CVA)

Customer value audit (CVA) is a process that consist a set of key elements which need to be addressed in the CVA process. These key elements are: identification of the benefits and sacrifices, trade between quality and price, distinction between customer segments and use situations, preference for multiple-informant approach and comparison of alternative supplier's offerings. The CVA process consist three steps: Start-up, Survey and Strategy formulation. The CVA process is illustrated in Figure 11.

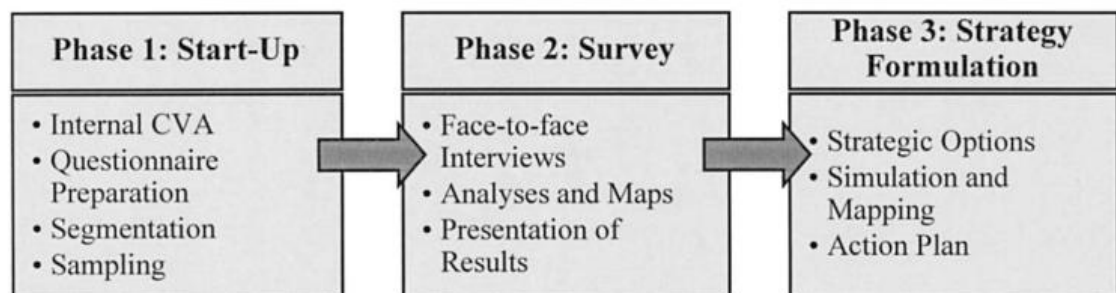


Figure 11. Steps and key elements of the CVA process (Ulaga & Chacour 2001: 532).

As shown in Figure 11, the target of the phase 1 is to determine the supplier's vision of the customer perceived value. The supplier's sales personnel creates a list of purchasing criteria. The sales personnel evaluates the criteria by the relative importance, altogether summing up to 100%. Based on this internal value evaluation, a customer questionnaire is developed. In the second step, the customer's key representatives are interviewed. The interviews are conducted with the key representatives from different functional areas involved in the purchasing process. The target of the phase 2 is to evaluate the customer value based on the difference between the client's expectations and perceptions of the performance. Customers are first asked to determine their purchasing criteria in the same way as for the internal customer value evaluation process, not considering any specific supplier. Secondly, the customers evaluate the performance of the supplier against their expectations. After the interviews, the data is analyzed and value maps are generated. Finally, the value maps then can be used by the

supplier to create strategic alternatives and to build action plans in order to change their position on the value map by simulating the potential impact of alternative strategic actions on the supplier's overall positioning. (Ulaga & Chacour 2001: 530 – 532)

Jalkala and Keränen (2014) presented a three-step process for the customer value assessment. The customer value assessment process is presented in Figure 12.

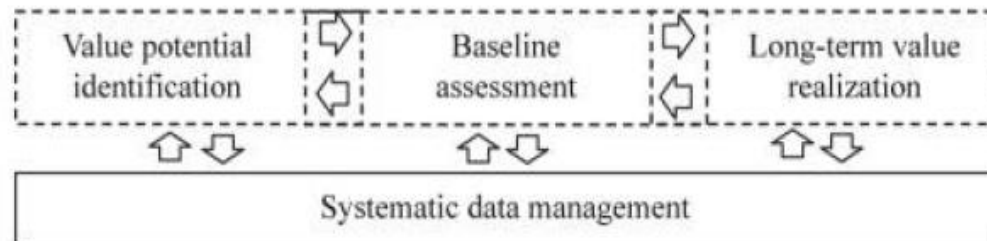


Figure 12. Customer value assessment process (Jalkala and Keränen 2013: 85)

As shown in Figure 12, the customer value assessment process includes: the identification of the value potential, the assessment of the baseline and the realization of the long-term value.

The *value potential identification* involves to understanding the logic of the customer's value creation and indicating the supplier's potential to add value to its customer's business. It is involved in identifying the customer's requirements and building an offering that satisfies the customer, and is ready before the delivery of the supplier's offering. In *Baseline assessment* the customers' current performance in selected business areas is defined. In this phase the offering is integrated and deployed to the customer's processes, and is finalized before the delivery of the supplier's offering. In *long-term value realization* phase the identified value potential realized after the delivery of the supplier's offering is verified and documented. It is involved to the post-delivery phase that can last for months to several years. As addition to these, the customer value assessment process provides fourth element: the systematic data management. The *systematic data management* is involved to the managing of relevant customer data during the value potential identification, baseline assessment, and long-term value realization, and is connected to all phases involved in the process of the value delivery. The customer value assessment process is sequential, while systematic data management is continuous and simultaneous with the other phases.

The literature proposes a systematic way for evaluating the customer value potential in the business markets which includes elements of understanding, identification and analysis of the customer value,

#### 4.5 Evaluation of the Customer Perceived Value in Solution Business

The findings from the best practice, business and academic literature point to a certain logic which reflected the business problems in the case company. Different elements from the best practice and literature create building blocks of this logic. Figure 13, shows how the building blocks of this logic merged as the conceptual framework for guiding the next steps in study.

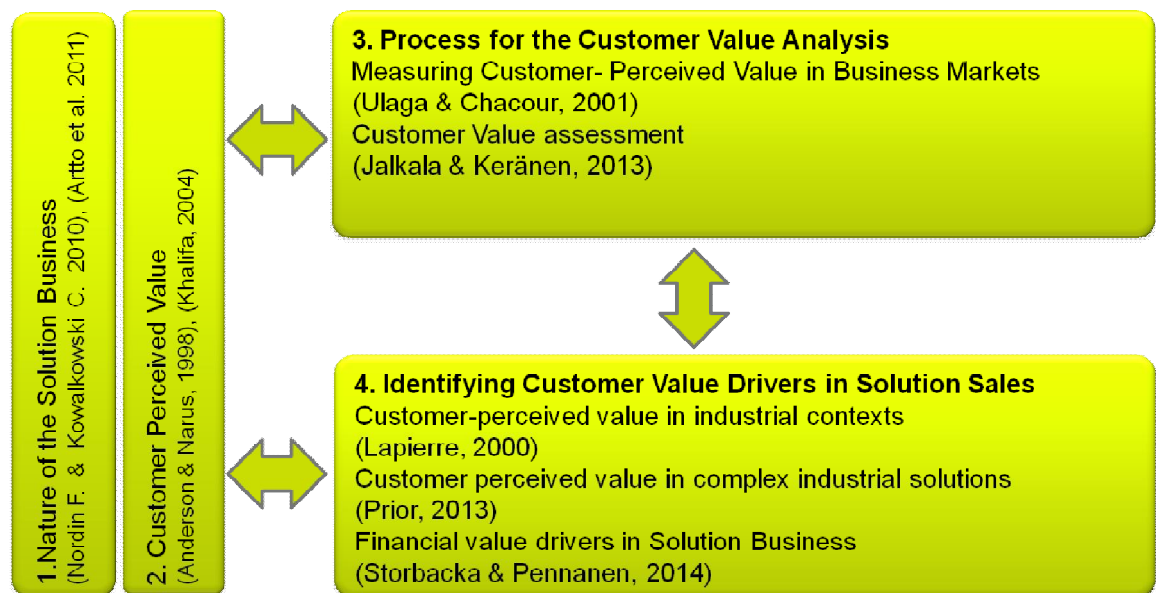


Figure 13. The conceptual framework of this study.

As shown in Figure 13, the building blocks for evaluating customer value in solution business consist: 1) Solution business environment and business models, 2) understanding customer perceived value, 3) analyzing customer perceived value and 4) identifying customer perceived value.

The conceptual framework illustrates logical process which can help to evaluate customer perceived value in solution business. The solution business environment and business model building block defines the term solution and builds an understanding of the solution business environment and business models. The building blocks from two to four are illustrating the actual process of evaluating customer perceived value in so-

lution business. The definition of what is the customer value and how it can be measured is created in the building block two. After creating an understanding of the customer value, the elements, drivers and practical actions related to customer perceived value can be identified. Finally, the identified customer perceived value items are analyzed and assessed to develop solution offering.

## **5 Conceptual Tools for Identifying Customer Value in Plant Solution Building**

This section merges the results of the current state analysis and the conceptual framework towards the building of the initial proposal for evaluating customer perceived value in solution offering of the case company. First, it describes how data collection and analysis were done and presents the steps in the proposal building. After that, the conceptual tool for evaluating customer perceived value is discussed. This section ends in a summary of a preliminary conceptual tool for evaluating customer perceived value of solution offering.

### **5.1 Current Challenges in Plant Solution Building**

As the current state analysis revealed, the evaluation of the customer perceived value of the plant solution proposals was recognized as an important area of improvement. Once the current state analysis and conceptual framework was completed, the initial status and findings were taken as a starting point for building the initial proposal.

Since evaluation of the customer perceived value holds the most important role in the process of the plant solution creation process, understanding, identifying and analyzing the customer needs creates the ground for the competitive customer solution offerings. Without a true understanding the customer needs, it is impossible to create a solution that would solve the customer-specific problem. Since the customers are heterogeneous, general customer value quantifications cannot be used. The customer's are having individual organizations, capabilities and needs which are influencing to the value quantification. However, the value drivers and actions are common in the solution business and conceptual tools can be used.

Therefore, the CSA concentrated on identifying the customer value in this particular area, among other challenges identified in the current plant solution building process. The key findings included three selected challenges which belong to this area, namely: a) the lack of customer view in the current solution sales process, b) lack of customer value assessment practices and c) lack of project practices in the plant solution proposal development. These selected areas were used for discussion in the team and with the key stakeholders to find solutions for identifying the customer value in building plant solution proposals in the case company.

## 5.2 Building Conceptual Tools for Identifying Customer Value in Plant Solution Building

Various data sources were used to build the initial proposal. Figure 14 illustrates how the data was collected and how the initial proposal was built.

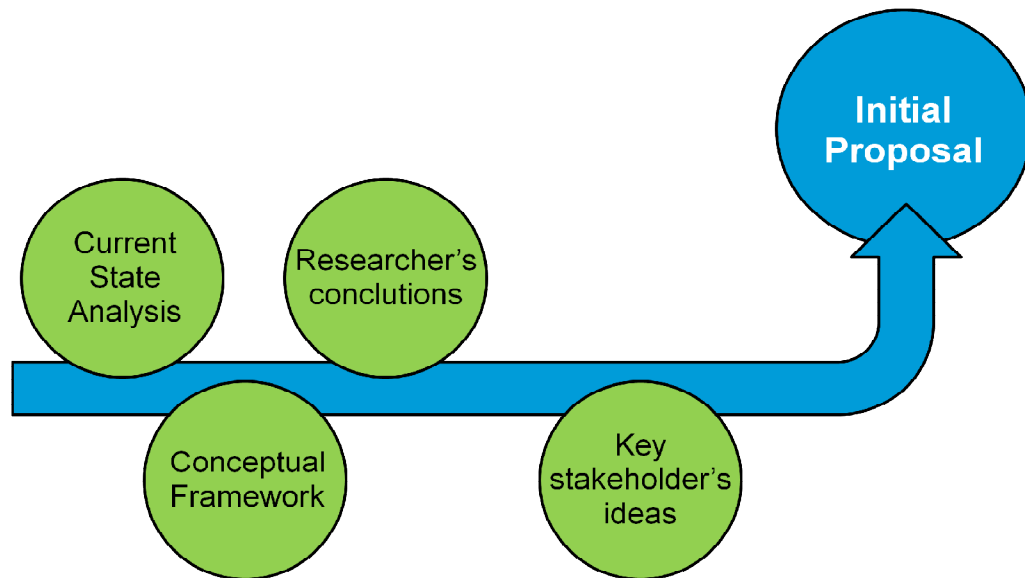


Figure 14. Process of building initial proposal of this study.

As shown in Figure 14, the initial proposal is a combination of the findings from the current state analysis, best practice found from literature, improvement ideas gathered from the workshops and the researcher's own conclusions.

## 5.3 Draft Proposal for Identifying Customer Value in Plant Solution Building

The current solution sales process was analyzed from the customer value perspective. The analysis revealed that the customer value analysis needs to happen in the sales opportunity verification and the sales case development. Firstly, the case-specific customer value drivers need to be identified in order to quantify and verify the sales opportunity. This data can be also used for evaluating the sales case and its importance in the total sales funnel. Secondly, the customer value drivers need to be analyzed in order to build the plant solutions which are fulfilling the customer needs. To help this, the customer value analysis (CVA) (Ulaga and Chacour, 2000) was selected. The CVA was used as a framework for the initial proposal of identifying the customer value in building plant solution proposals. The CVA was merged to the current solution sales

process and was integrated to the sales opportunity verification phase. Figure 15 illustrates the proposal draft before comments and development ideas from the key stakeholders.

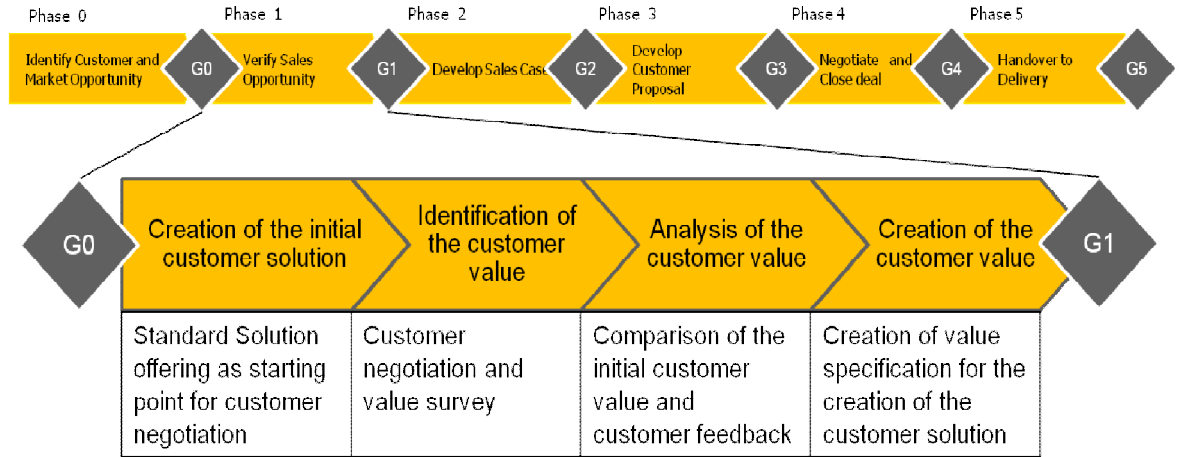


Figure 15. Proposed draft of the process for customer value analysis.

As shown in Figure 15, the initial process consist four steps; creation of the initial customer value proposal, identification of the customer value, analysis of the customer value and creation of the case-specific customer value proposition. In the first step, the initial customer value proposition (CVP) is created. In this phase, the initial CVP is based on the current information of the customer case and general understanding and experience of the plant solution business. The initial CVP is used as a starting point for the customer discussions. The initial CVP is completed with a set of key questions for the customer to get deeper understanding of the needs of this particular customer and case. The main purpose of this step is to prepare the sales team for the customer meeting.

The second step is the identification of the customer value. This step is executed with the customer through an interview. The sales team interviews the customer and creates a better understanding of the customer needs in this particular project by asking the key questions prepared in the first step. The customer is also asked to identify and quantify the value drivers of the case project. The purpose of this step is to create good understanding of which value drivers are most important and what is their relative importance for the customer in this particular project. In the third step, the initial and customer's value drivers are compared and analyzed. This step identifies the differences between the internal and external customer value analysis. Conclusions from this step

are then used for creation of the case-specific customer value metrics in the final step. The final step is conducted to create customer value metrics for the development of customer solution and proposal.

To improve the usability of the proposed process, quantification template was developed in order to help internal and external customer value quantification. Figure 16 presents the value quantification template (next page).

As shown in Figure 16, the quantification template consists of the value drivers from capital expenditure (capex) and operational expenditure (opex) areas. As it was demonstrated previously, identification of the customer value from both areas is important in the plant solution business. The decisions made in capex phase have impact on the opex phase. However, different customers perceive the value between these phases differently. Therefore, it is important to identify the ratio between capex and opex in the very beginning of the project.

There are variations and multiple reasons how the customers perceive the value in opex phase. Some customers are capex orientated and put less focus on the opex benefits, while others carefully consider the capex costs from the opex cost perspective. These decisions have impacts on the customer value metrics in the plant solution building phase. The capex and opex phases include several value drivers which together build the total customer value. In the proposed solution, these value drivers are quantified individually by their relative importance to the total customer value. This means that the total sum of the value drivers is 100%. The relative importance is valuable data for the case company in order to manage the emphasis of the different elements of the plant solution building. For example, if the customer resists using low cost manufacturing services, is not interested in high-end automation solutions, is willing to have cheaper materials in equipment, or requests using some specific third party components, the reasons may be various. Maybe the customer does not have competences to run the daily-based maintenance operations or high-end automation, or the customer has corporate level agreements with the specific component manufacturers. Therefore, the proposal draft was completed with an idea of a questionnaire template to help the sales teams to gather valid customer value data and thus gain more precise data for decision making and treat the customers differently, according to their wishes.

Type of scope	Type of value	Value driver	key words	Importance	Capex/Opex
Capex	Product	Alternative solution	Range of products (breadth)	14	100
Capex	Product	Product quality	Product characteristics	20	
Capex	Product	Product quality	Natural Product Character	5	
Capex	Product	Product quality	Ease of use	5	
Capex	Product	Product quality	Consistency of products	6	
Capex	Product	Product customization	other	1	
Capex	Service	Responsiveness	Quick service/response	10	
Capex	Service	Reliability	Reliability and speed of supply	8	
Capex	Service	Flexibility	Ability to adjust products and services	3	
Capex	Service	Technical competence	Technical support/application	13	
Capex	Relationship	Supplier's image	Image, corporate identity	6	
Capex	Relationship	Trust	Reliability of supplier	3	
Capex	Relationship	Solidarity	Personal relations	4	
Capex	Relationship	Solidarity	other	2	
Opex	Financial	Increased revenues	Higher volumes and higher quality	?	0
Opex	Financial	Lower operational cost	Fewer man hours, less tool wear and lower material consumption	?	
Opex	Financial	Less tied-up capital	Longer machine life-time	?	
Opex	Financial	Lower risk	Less unplanned downtime, lower risk for scrap	?	
			Total	100	100

Figure 16. Proposed template for quantifying customer value.

This proposal draft shown in Figure 16, including the customer value analysis process and customer value quantification template, was discussed with to the key stakeholders, evaluated and further developed. Another request for the key stakeholders was to identify the questions which would help in the collection of the data for the value driver quantification.

#### 5.4 Initial Proposal for Identifying Customer Value in Plant Solution Building

The proposal draft was commented on and evaluated by the stakeholders in a series of the workshops. The proposal draft was also benchmarked to the practice and the current process of the solution sales. Due to the longitudinal nature of the solution building and solution sales, the customer value analysis was considered as challenging. It was concluded that the customer value drivers are further developing over the time in the sales process. This time was allowed since the customer value drivers are influenced by the actions and decisions in the customer’s true investment project. Additionally, it is typical that the end customer is changing during the solution building process. Therefore, the customer value needs to be analyzed in a longer period of time, not only in the sales opportunity verification phase. The process itself was considered as usable and appropriate. Accordingly, the proposal draft was modified to cover the sales opportunity verification and the sales case development phases. Figure 17 illustrates the revised proposal draft.

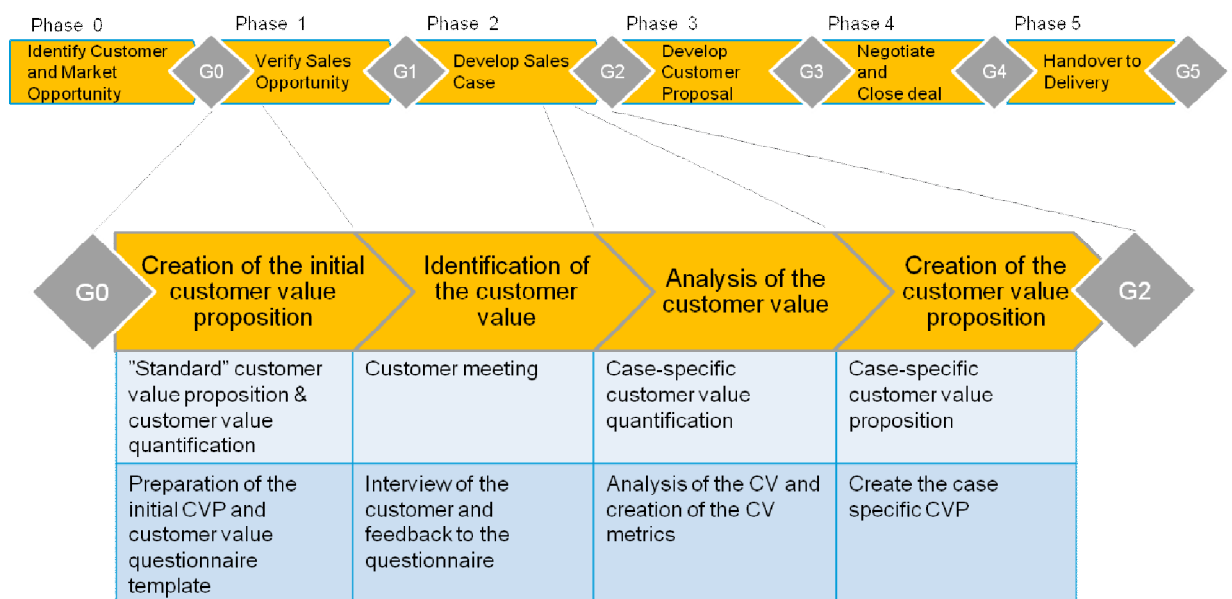


Figure 17. Proposed process for customer value analysis in plant solution sales.

As shown in Figure 17, the proposal draft was revised according to the evaluation by the key stakeholders. The process is considered to be executed over the time within phases 1 and 2. The identification of the customer value is the most important step and requires most of the effort. It has iterative nature and it is happening over phases 1 and 2. According to a Sales Manager:

*“The value cannot be identified in a one interview, it will change since the customer may change during the solution sales process.” (DATA 2)*

Iterative nature means that the data is not possible to be gathered in a one encounter. It has to be collected over the time and needs to be revised several times during the process. On the other hand, the case company has a possibility to influence the customer value drivers and guide the customer in value creation. The key target of the process is to have the customer value data gathered in order to create the case-specific customer value metrics in the final step of the customer value analysis process. This data is then used in the next steps for creation of the case-specific customer value proposition and a specific plant solution.

The second part of the proposal draft was the template for quantifying customer value. In addition to the quantification template, the customer value questionnaire template was built to help the sales teams in gathering the data for customer value identification. A lot of discussion was done in order to understand to meaning and usability of this template. However, after establishing common understanding, the value quantification template was considered usable. Especially for the engineering organization, a numeric presentation was considered as a good approach, even though it can be challenging to estimate the value in numbers. The value drivers were considered as topics defined on a high level that needs to have practical interpretations and specific explanations from the case company.

Figure 18 shows the questionnaire template for identifying the customer value.

## **Customer Value Analysis Questions for Plant Solution Sales teams**

In conclusion, this research study proposes a set of questions that will help the plant solution sales teams to audit the customer value.

1. What is the expected lifetime of the mine? Does the customer have a plan for the life-cycle of the mine which will tell us how the mine is planned to be developed during the life-cycle, how the tailings management and the water management is planned to be done?
2. What is the Customer's business? How the end-product will be utilized? Is it produced to be on a global market or treated in specific metals production plant?
3. What is the capital investment strategy? How the Customer perceive the relation between operational and capital expenses? Is the customer searching for reduction of capital costs or optimization of the operational expenses? What is the planned capex budget?
4. What are the alternative solutions and what are the competitive characteristics of those? Do we have competitors and what do we know about them?
5. What is the expected availability and reliability of the plant?
6. What is the plant operation and maintenance strategy? How the plant is planned to be operated and how the maintenance operations are planned to be executed?
7. What is the expected quality level and life-time of the equipments? Is the customer searching for low cost, manually operated and reactively maintained or high quality, fully automated and proactively maintained equipments?
8. What are the requirements regarding global, national or corporate level standards and regulations? Does the customer have corporate level agreements with other parties like mechanical wear parts, chemicals, electrical components and systems, etc.?
9. What are the expected communication channels, processes and tools? Is it allowed to communicate directly or does the data need to be directed through the central contact point?
10. Who are the decision makers in the customer's organization and what is their professional background? Who are the persons in customer's organization that are influencing to the decision makers?
11. What is the capability of the Customers' project organization? Do they have all required managerial and technical competence to run the project? Is there other stakeholders working inside the Customer's organization e.g. engineering and other service providers?
12. How the project is planned to be implemented? Is there a project plan for the whole mine project available? Is there binding and valid agreements with other stakeholders already like civil constructor and electric power provider and constructor?
13. What kind of initial technical data or plans are available (previous studies or designs)? How strictly this data needs to be followed?

Figure 18. Proposed template for the customer value questionnaire.

As shown in Figure 18, the customer value questionnaire consists of 13 questions. These questions are built to enhance the customer value information which is quantified with the customer value quantification template and later on used to build the criteria for the case-specific customer value criteria.

Questions 1, 2 and 3 are conducted to deepen the understanding of the maturity of the customer investment project. It also investigates the customer's business model and capital investment strategy in this particular case. This data is very important from two reasons. Firstly, it tells if the case is feasible and is it worthwhile to be continued. Secondly, it tells the maturity of the case and the timing of the effort to be invested. This data can be used in managing the overall plant solution sales funnel and for managing the resources. According to Sales Manager:

*“By asking these three questions from the customer, we know if it is reasonable to continue the discussion, either the customer has a real case and we can continue or we are already too late or we do not have the offering that they are searching and will direct them to other supplier’s”. (DATA 2)*

Questions from 4 to 8 are focused on the product related issues. The question 4, investigates the competition and alternative solutions. It sorts out the competitors and clarifies their solutions and competitive characteristics. Questions 5, 6 and 7 are focusing on the product quality. Question 5 examines the plant availability and reliability. These are the key measures build the overall framework for the quality of the plant. The key measures are building the initial understanding of the plant operation and maintenance strategies. These strategies are validated by Questions 6 and 7. The markets identifies various terms for these strategies and these interpretations needs to be clarified with practical actions like how many field and control room operators are planned to be needed for the production or how the plant maintenance is planned to be executed. These questions are building better understanding of the requested level of automation and digitalization of the plant systems and/or requirements of the mechanical maintainability of the equipments. Question 8 investigates the customization requirements. Global and local standards and requirements are influencing the technical requirement of the solution and product. In addition, the customer might also have corporate level standards that require using some specific materials and chemical or specific component suppliers.

Questions from 9 to 13 are investigate service items. Questions 9 and 10 clarify the expectations related to the responsiveness. To be able to respond quickly and effectively, the communication channels, process and tools need to be agreed. Additionally, it is important to identify the decision makers and other influencers in the customer's organization in order to speed-up the communication and responsiveness. By understanding the roles of different people in the customer's organization, the data and responses can be directed to right people in a professional and expected manner. The Engineering Manager says:

*“Some disciplines need detailed discussions already in the sales phase. Therefore it is important to have direct links to the customer's specialists to be able to build desired outcome for the proposal”. (DATA 2)*

Question 11 examines the technical competence expected. By understanding the competence level of the customer's organization, the case company is able to identify the competence gaps and modify its service offering in order to include all the required competences to deliver the solution. It is quite typical that the customer's organization is rather small and lot of actions is required from the supplier's organization. However, quite often the customer's organization has some special competences that the customer is willing to use and do some of the work by themselves.

Question 12 investigates the reliability of the services. The reliability was identified as one of the most important value drivers in the plant solution sales. The service reliability has an influence to the perceived product quality. Therefore it is important that the service offering has as high quality targets as the product. In plant solution building the related services needs to be planned carefully. It was concluded that the project management and technical competence are the most important elements in building reliability of the services in the plant solution sales. The purchasing decisions that the customer makes are heavily related to the reliability and trust to the company's project management capabilities and technical competences to solve up-coming issues, and about the gut feeling of the cooperativeness of the solution provider's personnel. The reliability in plant solution sales can be improved by enhancing and modifying the delivery processes and procedures. These are, for example, communication, planning, risk management and coordination processes and practices. Finally, Question 13 examines quality of the initial technical data provided by the customer. The quality of the technical data determines if the case company is capable to provide required solution

with the given initial data. With these questions the customer value can be improved in building of the plant solutions in the customer proposal phase.

Summing up, identifying of the customer value in the plant solution building, discussed in Section 5, included three parts which led to the proposal for the case company. Additionally, these three parts may be used for revising the conceptual tools and the process in the future. Therefore, the process, the quantification template and the questionnaire template were considered as the conceptual tool for identifying the customer value in the plant solutions for the solution sales team.

If summarized, the proposed conceptual tools and the steps for building it include the following main elements.

Firstly, the conceptual tools consist of the customer value analysis process which provides a structured way to collect and analyze the customer value in the plant solutions. The customer value analysis process consist four steps: (a) creation of the initial customer value proposition, (b) identification of the customer value, (c) analysis of the customer value, and (d) creation of the case-specific customer value proposition.

Secondly, the initial proposal provides the customer value quantification template which can be used for analyzing the customer value. It consists of fourteen value drivers which are quantified by their relative importance from the total value of the plant solution. This template can be used for internal as well as external customer value analysis, and finally, are used for defining and quantifying the case-specific value metrics.

Finally, the initial proposal offers a set of questions for investigating and collecting the customer value data from the customer in order to build the external customer value analysis. These questions are formulated into the template format and consists questions from all value driver areas which can be found from the customer value quantification template.

The validation of this initial proposal is discussed in the next section.

## 6 Validation of Proposal for Identifying Customer Value in Plant Solution Building

This section presents the results from the validation of the initial proposal for identifying customer value in the plant solution building. First, the organization of validation round, data collection and the findings are discussed. Second, the final proposal for identifying the customer value in the plant solution building is presented. Finally, the section finalizes by presenting the recommendations for the next steps in order to implement the proposed improvements.

### 6.1 Feedback for Proposal for Identifying Customer Value in Plant Solution Building

The validation round was conducted with the management of the solution sales and proposal management in a form of a discussion session. The initial proposal for identifying the customer value in plant solution building was collected into a presentation which was delivered to the management before the discussion session. This was made in order to increase the quality of the discussion as the management had a possibility to see the material before and to be prepared for the session. The presentation included the current state analysis including the summary of the findings and the conceptual tool including the customer value analysis process, quantification template and the list of questions.

Final feedback to the proposals for identifying customer value in plant solution building consisted of the following comments: (a) For the Current state analysis, which included no additional comments received to the summary of the current state analysis as an input to the outcomes. The analysis results were accepted and valid. (b) For the customer value analysis process, the management concluded that the proposed process needed some modification related on timing and the content of the process steps. There was lot of discussion of the solution sales process. Different interpretations of the solution sales process itself disturbed the discussion. After finding common understanding of the solution sales process, the validation of the process of the customer value analysis could be started. First, the management proposed some changes to the process to clarify it and make it more customer orientated. The management noted:

*“Instead of starting the sales opportunity verification by presenting the standard solution, the process should be started by screening the opportuni-*

*ties and preparing initial value proposition based on account planning.” (DATA 3)*

Second, the management argued that to be able to get it right in customer proposal development phase, the initial value proposition needs to be validated by the customer. These changes were agreed and based on these changes the initial proposal for customer value assessment process was defined as validated. (c) For the customer value quantification template, the management concluded that the proposed quantification template is too complex and it needs some simplification in order to make it more usable for the sales teams. First, the information of the type of the scope and the relation between capex and opex was not considered valuable. Second, the management argued that there are millions of value drivers and these are not reasonable to indicate in the value quantification tool. However, the proposed value drivers should be named as value driver topics and these value driver topic areas should be quantified. These changes were agreed and based on these changes the initial proposal for customer value quantification was defined as validated. (d) For the customer value questionnaire template, the management concluded that necessary value questions were included and no further feedback was necessary to provide.

## 6.2 Final Proposal for Identifying Customer Value in Plant Solution Building

The proposal for identifying customer value in the plant solution building was created in Section 5 based on the results of the current state analysis conducted in Section 3 and the best practice and the conceptual framework created earlier in Section 4. This proposal was presented to the management and validated to form the final proposal of the outcome. The validated and final proposal for identifying customer value in the plant solution building is presented in Figures 19, 20 and 21.

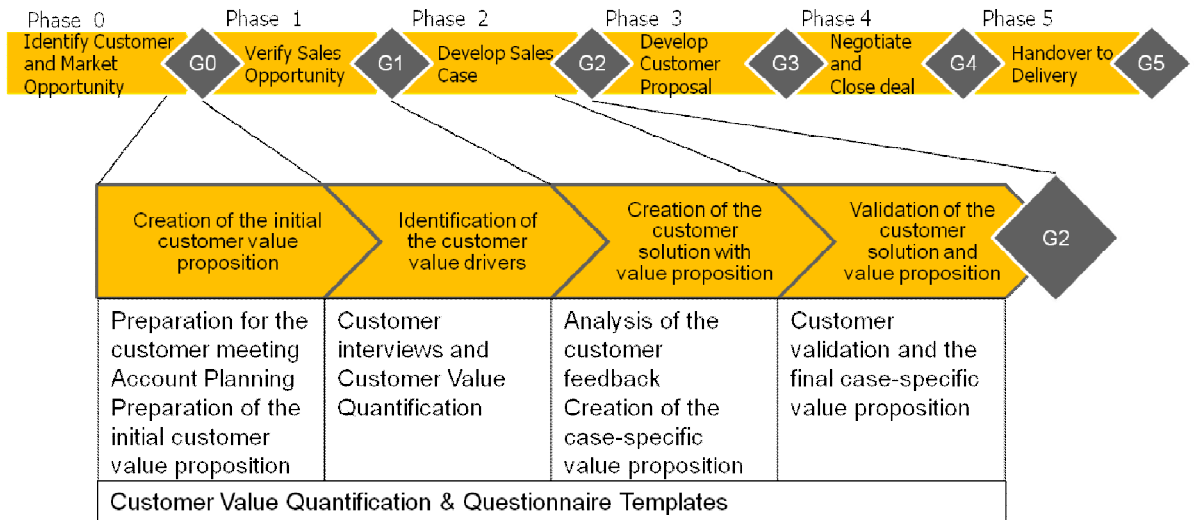


Figure 19. Final proposed process for analysis of the customer value in building plant solution.

As shown in Figure 19, the final proposal for the process of the customer value analysis in the plant solution building is revised according to feedback from the management.

Figure 20 illustrates the customer value quantification template.

<b>Value element</b>	<b>Value driver topics</b>	<b>Importance</b>	<b>Value driver examples</b>
Product	Alternative solution		Range of products (breadth)
Product	Product quality		Product characteristics, ease of use, ....
Product	Product safety		Process safety, human safety, machine safety
Product	Product sustainability		Environmentally soundness
Product	Product customization		Readiness for customer tailoring
Service	Responsiveness		Quick service/response
Service	Reliability		Reliability and speed of supply
Service	Flexibility		Ability to adjust products and services
Service	Technical competence		Technical support/application
Relationship	Supplier's image		Image, corporate identity
Relationship	Trust		Reliability of supplier
Relationship	Solidarity		Personal relations, other, ...
Financial	Increased revenues		Higher volumes and higher quality
Financial	Lower operational cost		Fewer man hours, less tool wear and lower material consumption
Financial	Less tied-up capital		Longer machine life-time
Financial	Lower risk		Less unplanned downtime, lower risk for scrap
	<b>Total</b>		

Figure 20. Final proposed template for quantifying the customer value.

As shown in Figure 20, the final proposal for the customer value quantification template in the plant solution building is revised according to the feedback from the management.

The Figure 21 introduces the customer value questionnaire template.

## **Customer Value Analysis Questions for Plant Solution Sales teams**

In conclusion, this research study proposes a set of questions that will help the plant solution sales teams to audit the customer value.

1. What is the expected lifetime of the mine? Does the customer have a plan for the life-cycle of the mine which will tell us how the mine is planned to be developed during the life-cycle, how the tailings management and the water management is planned to be done?
2. What is the Customer's business? How the end-product will be utilized? Is it produced to be on a global market or treated in specific metals production plant?
3. What is the capital investment strategy? How the Customer perceive the relation between operational and capital expenses? Is the customer searching for reduction of capital costs or optimization of the operational expenses? What is the planned capex budget?
4. What are the alternative solutions and what are the competitive characteristics of those? Do we have competitors and what do we know about them?
5. What is the expected availability and reliability of the plant?
6. What is the plant operation and maintenance strategy? How the plant is planned to be operated and how the maintenance operations are planned to be executed?
7. What is the expected quality level and life-time of the equipments? Is the customer searching for low cost, manually operated and reactively maintained or high quality, fully automated and proactively maintained equipments?
8. What are the requirements regarding global, national or corporate level standards and regulations? Does the customer have corporate level agreements with other parties like mechanical wear parts, chemicals, electrical components and systems, etc.?
9. What are the expected communication channels, processes and tools? Is it allowed to communicate directly or does the data need to be directed through the central contact point?
10. Who are the decision makers in the customer's organization and what is their professional background? Who are the persons in customer's organization that are influencing to the decision makers?
11. What is the capability of the Customers' project organization? Do they have all required managerial and technical competence to run the project? Is there other stakeholders working inside the Customer's organization e.g. engineering and other service providers?
12. How the project is planned to be implemented? Is there a project plan for the whole mine project available? Is there binding and valid agreements with other stakeholders already like civil constructor and electric power provider and constructor?
13. What kind of initial technical data or plans are available (previous studies or designs)? How strictly this data needs to be followed?

Figure 21. Final proposed template for the customer value questionnaire.

As shown in Figure 21, the final proposal for the process of the customer value analysis in the plant solution building is proposed without any changes.

Summing up, the final proposal for identifying the customer value in the plant solution building is the improved version of the initial proposal presented earlier in Section 5. These improvements based on the feedback from the management enhanced the usability of the proposed conceptual tools and improved the customer focus of the proposed process.

## 7 Discussion and Conclusions

This section presents the main results of the study and proposes possible next steps for implementing the proposed conceptual tools for improve the customer value in plant solution building. It also evaluates to objectives and outcome of the study. Finally, it discusses the validity and reliability of the study and its research process.

### 7.1 Executive Summary

This study focused on identifying customer value in the plant solution building. The business problem arose from the profitability and sales hit-rate challenges in the case company's plant solution business. To improve this area, the study concentrated on creating the conceptual tools to identify and analyzing the customer value in the plant solution business.

The nature of the case company's plant solution business in minerals processing business area is to develop and deliver concentrate production plants to the external customers. The case company's plant solutions include a certain scope of products and services which are together creating a plant solution. This solution is then delivered to the customer in a form of a project. The customer perceived value in the plant solution business is evaluated as a trade-off between benefits and sacrifices where the benefits are the total benefits perceived by the customer in the exchange and use of the solution, and the sacrifices are the total monetary and non-monetary sacrifices that the customer is paying in the exchange and in the usage of the solution.

This study proposes conceptual tools aimed at improving the plant solution proposals in minerals processing. To achieve this goal, the tools were proposed for better identifying the customer value in the plant solution business. The nature of the solution business, the customer perceived value, identifying the customer perceived value in solution business and analyzing the customer perceived value built the conceptual framework and theoretical grounding for the proposed tools.

The proposed customer value analysis is a process which consist four steps. These steps are: (a) creation of the initial customer value proposition, (b) identification of the customer perceived value, (c) analysis of the customer perceived value, and (d) creation of the case-specific customer value proposition. Together these parts forms the

conceptual tools for the customer value analysis in the plant solution building proposed in this study.

The identification of the customer perceived value in the plant solution business consist two main areas; capital expenditures (capex) and operational expenditures (opex). Both consist of different value drivers which are influencing the customer perceived value. In capex, there are value drivers which are related to the products, services and relationship since opex is considering financial drivers. In customer value analysis, the practical actions related to these value drivers are identified and quantified.

Currently, the case company is lacking of the procedures and tools for analyzing the customer value in the plant solution building. Admittedly, the data is collected from customer through various conversations, but the data is not documented and shared inside the organization. Consequently, the customer proposals are based on the technical data and very less of the intangible customer data is used in the plant solution building. The usage of the intangible data depends on the individual persons and their approach for the plant solution building in the customer proposal development. Accordingly, the quality, attractiveness and competitiveness of the customer proposals vary substantially. Additionally, since the total customer value is not analyzed professionally, this data is not been used in the sales funnel management.

The research approach in this study was action research. The action research was conducted in several steps. The first step was conducted for analysis of the current state of the plant solution building in the customer proposal development. This step was focusing on recognizing the strengths and weaknesses of the current process of the plant solution building. The findings were analyzed to identify potential improvement areas of the current process of the plant solution building. The interviews with the key stakeholders and the case company's internal documentation provided the data source for this analysis. The second step was to investigate the best practice of the customer value, identification of the customer value and analysis of the customer value. The third step was to build the conceptual tools for analyzing the customer value in the plant solution building. These conceptual tools created the final outcome of this study. This study was validated internally and considered as a starting point for the development of more customer focus in the plant solution building of the minerals processing unit in the case company.

## 7.2 Managerial Implications

The outcome of the study is a set of conceptual tools for improving the plant solution proposals in minerals processing. The key improvement relates to better identifying customer value in the plant solution proposals building. If the case company is considering the implementation of these suggestions, the following the recommendations and next steps may assist in the implementation.

- 1) To initiate and encourage a detailed discussion about the customer value in the plant solution sales with a wider audience. Especially, the product lines and life-cycle service representatives should be involved in this dialog.
- 2) To include the proposed customer value assessment process into the current solution sales process. There are several recognizable similarities which will help to incorporate the proposed customer value assessment process into the current solution sales process.
- 3) To integrate the proposed template of the customer value questionnaire into the current tools of building plant solution proposals.
- 4) To incorporate the proposed template for customer value quantification into the current tools of building plant solution proposal.
- 5) To define common rules for the customer value quantification.

## 7.3 Outcome vs Objective

The objective of this study was to improve the customer value in the plant solution building. The objective was addressed through three outcomes: the process of the customer value analysis, the customer value quantification template and the customer value questionnaire template. First, the process of the customer value analysis was created to provide structured way to analyze the customer value in the plant solution building which can be commonly used as a part of the current solution sales process. Second, the customer value quantification template was created in order to ease the usage of the process of the customer value analysis and most importantly to provide common drivers for the customer value analysis. Third, the customer value question-

naire template was developed to help the sales team in collection of the customer value input from the customers. This template can be used as a starting point and check-list for the discussion with the customer. To conclude, all the outcomes which were set as targets for the study, namely the conceptual tools for analyzing the customer value in the plant solution building, were produced, so therefore the objective can be considered to be achieved.

#### 7.4 Reliability and Validity

According to Section 2.3, numerous of actions were taken to ensure the validity and reliability of this study.

Firstly, various data sources such as internal company documents, face-to-face interviews, collective gatherings from the workshops and researchers own observations were used. The data collected from the interviews were returned to the interviewees for validation and comments. To avoid researcher's personal bias, the key stakeholders and the management were involved several times during the study to collect their ideas, check for their interpretations and conclusions. Each data collection and analysis of the data was shown transparently and reported in detail. Secondly, the participants involved to the study were representing various fields of expertise. Thirdly, well-established academic and business literature were chosen to form conceptual framework for the study.

At the end, as the trend in the manufacturing industry is to move from equipment business into the solution business, companies ought to pay more attention to how the customers perceive the value in the solutions. Thus, the service and relationship are important elements, and companies should keep in mind that these intangible value drivers are playing remarkable role in the total customer value in the solutions. Therefore, to be successful in the future, it is vital to be able understand, identify and analyze the tangible and intangible customer value in the solution business.

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## Appendix 1

### Current state analysis interview Solution Proposal Creation Process Development

#### Information about the informant (DATA 1)

Table 1

Details	
Name (code) of the informant	
Position in the case company	
Date of the interview	
Duration of the interview	
Document	

#### Field notes (DATA 1)

Table 2

	Topic(s) of the interview	QUESTIONS	FIELD NOTES
1	Starting point	<p><i>How do you involve to the customer proposal creation process?</i></p> <ul style="list-style-type: none"> <li>- <i>Role</i></li> <li>- <i>Responsibility</i></li> <li>- <i>in practice</i></li> </ul>	
2	Current state	<p><i>What do we do now in Customer Proposal creation in Solution Sales?</i></p> <ul style="list-style-type: none"> <li>- <i>Clarity of Roles &amp; Responsibilities</i></li> <li>- <i>Collaboration with stakeholders</i></li> <li>- <i>Internal communication</i></li> <li>- <i>Quality &amp; Response time</i></li> <li>- <i>Customer Value Proposition? (How well our solution offering fits to Customer needs?)</i></li> </ul>	
3	Identify strengths	<p><i>What's good in our current Solution Proposal Creation Process?</i></p>	

4	Identify weaknesses	<i>What's wrong in our current Solution Proposal Creation Process?</i>	
5	Key concerns	<i>What are your key concerns?</i>	

## Appendix 2

Initial Proposal Building – Workshop 1

Solution Proposal Creation Process Development

Information about the informant (DATA 2)

Table 1

Details	
Name (code) of the informant	
Position in the case company	
Date of the interview	
Duration of the interview	
Document	

### Field notes (DATA 2)

Table 2

	Topic(s) of the workshop	FIELD NOTES
1	Customer Value Analysis process	-
2	Customer Value Quantification template	
3	Customer Value Questionnaire (Questions/topics?)	-

### Appendix 3

Initial Proposal Building – Workshop 2

Solution Proposal Creation Process Development

Information about the informant (DATA 2)

Table 1

Details	
Name (code) of the informant	
Position in the case company	
Date of the interview	
Duration of the interview	
Document	

### Field notes (DATA 2)

Table 2

	Topic(s) of the workshop	FIELD NOTES
1	Customer Value Analysis process	-
2	Customer Value Quantification template	-
3	Customer Value Questionnaire	-

## Appendix 4

Validation of the Initial Proposal – Management Session

Solution Proposal Creation Process Development

Information about the informant (DATA 3)

Table 1

Details	
Name (code) of the informant	
Position in the case company	
Date of the interview	
Duration of the interview	
Document	

### Field notes (DATA 3)

Table 2

	Topic(s) of the workshop	FIELD NOTES
1	Customer Value Analysis process	
2	Customer Value Quantification template	
3	Customer Value Questionnaire	