

Erika Ines Aveli

# Proposing a Common ERP-based Process to Manage Price Lists

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Coming from abroad and not having prior professional experience in Finland made it challenging to find a place to develop my thesis. After overcoming this critical issue, the whole study has been an intensive and rewarding experience in several aspects. As my entire professional career was in my home country, Argentina, it was my first time being part of a global company even though not as a formal employee but in my role as a researcher. This was as well, my first working experience in Finland, which proved to be enriching given that the culture is considerably different to mine. I had a boss, and I had work colleagues! And I am really grateful to them all as they made it possible!

First of all, I want to thank my supervisor Dr. Juha Haimala and Zinaida Grabovskaia PhL, who was always keen to detail and giving persistent support in every stage. In addition, I am most grateful to all the people from the case company, beginning with the CEO who gave me the opportunity to develop my work, and the SCMD in Helsinki and in UK who have chosen the topic and gave me all the support to conduct the study. And my thanks go to all the stakeholders who kindly and generously shared with me all their knowledge and experience.

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<p>This study focuses on proposing a common, ERP-based process for two selected units of the case company to manage their price lists. It addresses the most important needs of the process such as security and accessibility of data. Additionally, the study presents the benefits of capturing the information available in the company and making it available and usable within the company.</p> <p>The research design includes five stages starting from the current state analysis, followed by the search for best practice which leads to shaping the proposal. First, the CSA was conducted discovering several issues to be addressed, being one of the most relevant the lack of security and accessibility in the fashion data is stored and kept. Then, relevant ideas were collected from best practice. Finally, the study involved stakeholders from both units in the discussion on the proposal building and then proposal validation. Since the researcher was not part of the case company but was in close collaboration with the participants, it helped to minimize the researcher bias.</p> <p>The outcome of the study is a common process that could serve as a starting point for further harmonization of the price list management. If found suitable, the logic behind the proposal can also be applied to a similar process needed also in other units of the company. The benefits of the proposed process are first, the security of key data such as price lists. Second, the accessibility to the data by the concerning departments. Finally, downstream processes and, most importantly, customers will be benefited by getting more accurate data. In addition, the proposed process can be implemented with the resources available in the company.</p>	
Keywords	Business Process Management, Knowledge Management, Data and Information Quality, Integration-Responsiveness

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## Acronyms

AM	Account Manager
BPM	Business Process Management
BPR	Business Process Reengineering
CSA	Current State Analysis
CSC	Customer Service Centre
ERP	Enterprise Resource Planning
ETZ	Electricity Surcharges
EUR	Euros
HK	Helsinki
IT	Information & Technology
KM	Knowledge Management
MTZ	Material Surcharges
NL	The Netherlands
SAP	Systems Applications and Products
SCMD	Supply Chain Manager Director
UK	United Kingdom
USA	United State of America
VAA	Value Added Analysis

## 1 Introduction

Growing competition is leading companies to search for optimization in any possible ways. Historically, capital-intensive companies tried to get the most from its production units, such as manufacturing or operations. Nowadays, the need to improve operations has urged companies to seek efficiency in every process they perform. One of these examples is the case company that is trying to improve a business process in its customer service center (CSC) which has a direct impact on customers.

This study focuses on the development of a more reliable process to manage price lists within the case company and with its customers. Price lists are used by many departments within the case company. Through using them, the prices are communicated to customers and require a well-designed process to prevent any misunderstanding or deviations. Currently, the case company does not have a common, standardized process regarding this issue, and looks for improvement in this respect.

### 1.1 Case Company Background

The case company of this study is a Finnish company that provide major iron and aluminium casting products in Europe, USA and Russia. It is one of the largest cast components and casting solutions provider in Europe. The company is casting, forging and machining components in Turkey, Finland, the Netherlands and Sweden. In addition to the mentioned countries, the company has customer service centres and sales offices in France, Germany, Italy, UK, USA and Russia. In 2014, the Group's net sales were EUR 495 million and it employed approximately 4,250 people. (Case company web-site 2016)

The company's customers are manufacturers of vehicles, machines and equipment in various industries who are local or global players and often market leaders in their own sectors. The case company provides them a wide range of services from advanced engineering and product design, to manufacturing and delivery of complete components and subassemblies in several different materials and surface treatments. (Case company web-site 2016)

## 1.2 Business Challenge

Over the years, throughout organic growth and acquisitions, the case company has grown from a small Finnish foundry into an international Group. Today, the case company is the second largest independent cast component supplier in Europe.

Although acquisitions have taken place several years ago, integration is not complete in several functions. Consequently, every local office has its way to perform tasks. These different ways of working are not only present from country to country but in some cases can be seen within the same local office. Similar is the situation with price list management process nowadays. Price lists are used mainly in Customer Service Centre (CSC) offices and in sales by Account Managers (AM). Thus, each office uses different kinds of price lists and, in some extreme cases, units may even end up storing the price lists labelled in different ways and present them in different styles. Many related processes are performed manually, thus leading to risks and discrepancies. Since the units are determined to avoid any possible errors related to prices when invoicing, the units have to check prices on an ongoing basis. Thus, the company sees many potential benefits by improving the current ways in which the prices are managed in some units.

## 1.3 Objective, Outcome and Scope of the Study

The objective to this study is to propose *a common, ERP-based process for two selected units to manage their price lists*. The outcome of the study is the process that can be applied by the two units, the Finnish and the Dutch ones, be integrated to the company ERP-system, and have common steps for both units. Such a common process could serve as a starting point for further harmonization of price lists management, if found suitable, between other units in the company.

The scope of this study is thus limited to the price list processes in two selected units. Considering the fact that prices are used and modified in every location, and also that the departments that handle or negotiate prices are sales and CSC, and finally, that the inputs in product price database are given by Engineering, CSC and Sales, the scope for this study will not be comprehensive for the whole organization. Thus, the analysis of the situation will be conducted with the input from two offices, Helsinki as the headquarters and the Netherlands, and the outcome is only applicable to them.

To extend the proposed outcome to other units, if deemed necessary, it would need further study in those specific contexts.

This study is written in seven sections. In Section 1, the company case is presented, followed by the business challenge, objective and scope of the study. In Section 2, the research methodology is chosen and grounded. In Section 3, the results of the current state analysis are analyzed. In Section 4, best practice and existing knowledge related to managing price lists are discussed and the relevant findings are selected and merged into the conceptual framework for applying them to proposal building. In Section 5, the preliminary proposal is drawn. In Section 6, the proposal will be validated and the final proposal formulated. Finally, in Section 7, conclusions of the study are presented and discussed.

## 2 Method and Material

This section describes the research approach, research design, data collection and analysis methods used in the study. First, the research strategy is chosen. Second, the research design is developed and explained along with the data and validation plan for this study.

### 2.1 Research Approach

There are different research approaches, each of them follow its own logic and possess a different way of collecting and analyzing data. In the same way, each of them has its advantages and disadvantages that are important to appreciate to choose the most appropriate one (Yin 2009). Three features typically distinguish the research approaches: the type of research questions posed, the extent of control that an investigator has over actual events and the degree of focus on contemporary events. What is more, from a philosophical point of view, a case study can be based on a constructivism paradigm where the truth is relative and dependent on a taken perspective.

A case study as a research approach relates to contextual conditions and allows a broad variety of data sources. Additionally, it pays considerable attention to the logic and structure of the study, visible in its research design. The logical sequence that connects the empirical data to the initial question of the research and its conclusions is the research design (Baxter, P. and Jack, S. 2008). The purpose of the design is to avoid the situation in which the evidence or the logic and methods of research do not address the initial research questions. (Yin 2009). Case study presents the advantage of close collaboration between the researcher and the participants enabling the participants to tell their views of reality and allowing the researcher to gain a better understanding of the phenomena through such collaboration. (Baxter, P. and Jack, S. 2008).

For the purpose of this study, the questions “how” and “why” are being posed. As an external agent, the researcher has little control over the events but analyses contextual conditions with focus on contemporary phenomena. From the perspectives mentioned above, the case study as a research approach is thus chosen for this study.

## 2.2 Research Design

The research design for this study consists of five stages. Figure 1 below shows each stage of the research design as well as the goal, input (data and topics), and outcome of this study.

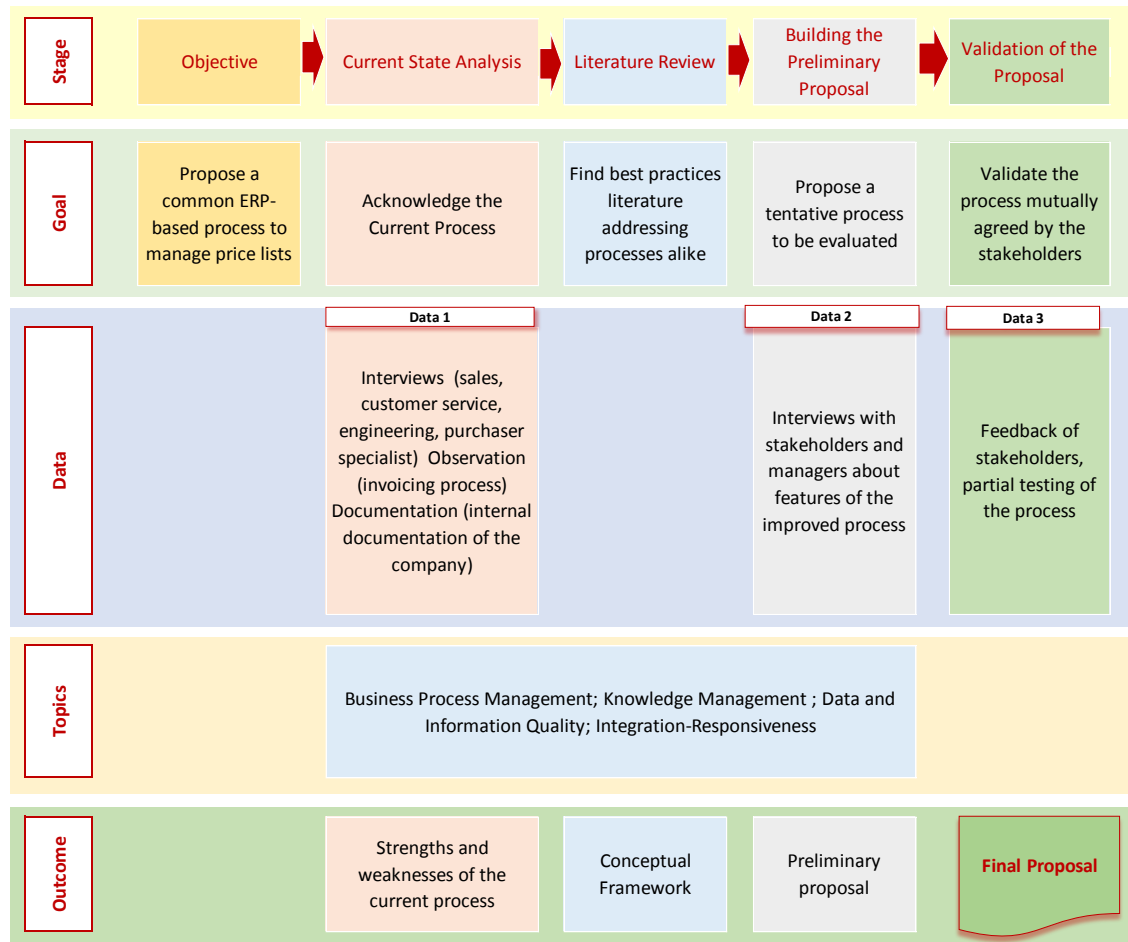


Figure 1. Research Design of this study.

As shown in Figure 1, the first stage of the study is identifying the objective. Based on discussions with the company management, the objective of the study was identified, along with the scope and challenges of the contextual circumstances.

The second stage of the study is the current state of analysis. The main goal for this stage is to recognize how the company perform the process now, who are the main stakeholders of the process, what is the documentation for this process and if the processes documented in existing descriptions are followed. The input gathered in this stage makes Data 1. The expected outcome of the stage are the strengths and

the weaknesses of the current processes, as they exist in two units, and the key challenges to be addressed.

The third stage identifies the relevant best practice from literature that could address the problems found in the CSA. The output of this stage is the conceptual framework of the study that should help to build the improvement proposal.

In the fourth stage, the preliminary proposal is built. In this stage, Data 2 is collected consisting of interviews with stakeholders and managers. The logic to construct the proposal is using the key issues found in CSA adding the Data 2 and, the ideas from the CF. Based in these three inputs the proposal is developed.

In the final stage, the preliminary proposal is validated. Feedback from the main stakeholders and the manager will make Data 3. According to the feedback, the final adjustments to the proposal are done defining the final proposal for the improved process. The final proposal will come along with recommendations related to the implementation of the proposal into practice.

### 2.3 Data Collection and Analysis Method

In this study, the data was collected in three rounds, Data 1-3. The sources of data for this study mainly come from three sources: (a) interviews and workshops whether face-to-face or online, (b) observations of the process, and (c) analysis of the internal units' documentation.

Three rounds of data collections are shown in Table 1 below.

Table 1. Three rounds of data collection 1-3.

Data	Data Type	Content	Analysis
Data 1	1. Interviews	1- Interviews with stakeholders about how the process is done. 2- Observation of the Invoicing process where most of the problems arise 3- analysis of the documentation available related to price list	Section 3
	2. Observation		
	3. Internal documents		
Data 2	4. Interviews and discussions	Interviews and discussions with managers and stakeholders about the features the improved process should have	Section 5
Data 3	5. Feedback data	Feedback on the proposed process; fine-tuning of the proposal	Section 6
	6. Testing of some selected elements		

Table 1 shows the source of each data collection; it also gives an idea of what type of data was used and in which section it was analysed. The primary data collected in this study was mainly the data coming from interviews and participant observations and was gather by the researcher. This data was supported by the analysis of internal company documents related to the current practices of managing price lists. More detail on the data is given below, for each data round.

#### *Interviews and Observations*

In this study, interviews make one of the key sources of data along with participant observations.

*Data 1* was collected for the current state analysis and consisted of interviews with managers and stakeholders from sales, engineering and customer services functions from different locations. Interviews with purchasing specialists from companies that buy products from the case company were also gathered. *Observations* of the invoicing process and uploading of information in the ERP system by Customer services and Engineering, along with the analysis of the documentation available for them in the company, completed the sources of *Data 1*. *Data 2* was the data utilized to design the improved process; it came from the interviews with the stakeholders and managers to collect the improvement suggestions. Finally, *Data 3* comes from the feedback of the stakeholders and the test of some elements of the proposed process. Table 2



below shows details of interviews and most informative of the observations conducted in this study.

Table 2. Details of Interviews and discussions.

	Department	Location	Date	Duration	Event
<b>Data 1</b>					
1	SCM Director	Hk /Uk	12/11/2015	1hr	meeting
2	Customer Service Centre	Helsinki	Nov- dic 2015	4hrs	observation
3	Sales	Helsinki	03/12/2015	1hr	meeting
4	Sales	Helsinki	10/12/2015	1hr	meeting
5	IT	Helsinki	03/12/2015	0,5hr	meeting
6	Customer Service Centre	The NL	15/01/2016	0,5hr	Lync meeting
7	Customer Service Centre	The NL	Jan-Feb 2016		e-mail
8	Customer Service Centre	Helsinki	09/02/2016	0,5hr	meeting
9	Engineering	Factory Fn	10/02/2016	1 hr	meeting
10	Customer Service Office	The NL	23/02/2016	1 hr	Lync meeting
11	Customer 1 Purchaser	Helsinki	05/03/2016	0,25hr	meeting
12	Customer 2 Purchaser	Helsinki	05/03/2016	0,25hr	meeting
<b>Data 2</b>					
13	Customer Service Centre	Helsinki	16/02/2016	1 hr	meeting
14	SCM Director	Helsinki	18/02/2016	1 hr	meeting
15	Customer Service Centre	Helsinki	18/02/2016	0,5 hr	meeting
16	Customer Service Centre	The NL	Feb		mail
<b>Data 3</b>					
17	Customer Service Centre	Helsinki	17/03/2016	0,5 hr	meeting
18	SCM Director	Helsinki	17/03/2016	0,25hr	meeting
19	Customer Service Centre	The NL	12/04/2016		mail
20	SCM Director	UK	05/04/2016		mail

Table 2 shows that interviews were conducted in the Helsinki headquarters, in the Netherland and in one of the factories that the company has in Finland. Interviewers

were mainly from CSC representatives, sales and engineering units. Supply Chain Directors were also interviewed. Interviews were taken in a semi-structured manner. Interviews were conducted in an informal manner, with open-ended questions, giving the interviewee the possibility to explore further some related issues and exemplified them. In Helsinki office and the factory, the researcher was able to conduct the interviews face-to-face, while in the Netherlands they were through online exchanges, followed up by e-mails. Observations were performed only in Finland, Helsinki office and the factory. To reinforce Data1, two interviews have been done with the purchasing specialists from case company's customers.

#### *Company Internal Documentation*

The study scrutinized the existing company graphics and written documents related to the price list management. Table 3 below lists the relevant documentation used in this study.

Table 3. Details of Company documentation.

	<b>Name of the document</b>	<b>Amount</b>	<b>Description</b>	<b>Location</b>
1	To be process, sales 140211	3 pages	Different stages of the sales process	Helsinki
2	Price List procedure V02	3 pages	How to update prices	The NL
3	Customer Service Center Manual	12 pages	Customer Service operations manual	Helsinki
4	OAM & NPI form rev3	3 pages	Order acceptance and New part introduction form	The NL

Table 3 shows, for this study, that the relevant documentation for processes comes mostly from the Helsinki office and two critical documents from the Netherlands. First, the "to be process sales 140211" describes the process from the sales perspective in Helsinki and can be seen in Appendix 1. In this process, the interactions with sales, CSC and engineering, are described. Second, the "Price list procedure V02" describes the steps to updating prices from the CSC perspective in The Netherlands.

The graphic process is depicted in Appendix 2. Third, the “Customer Service Center Manual” is the description from the CSC perspective in Helsinki, enumerating the activities performed by the departments. Appendix 3 contains the instructions about prices differences and invoicing. Fourth, Appendix 4 contains a template in which all the information needed to introduce a new product is detailed.

#### 2.4 Validity and Reliability Plan

Several validity and reliability tests may be applied to test the soundness and objectiveness of the qualitative case study. These tests include using multiple sources of evidence in data collection to perform triangulation in data, establishing a chain of evidence in data collection phase, comparison of evidence with the extent literature, assurance of congruence between the study elements and the study design, and other steps (Riege 2003). Yin (2009) establishes four tests to be applied during the study to assure the quality and truthfulness of a qualitative case study. He also identifies four tactics to deal with these tests (Yin 2009). These tests are: construct validity, internal validity, external validity, and reliability.

*Construct validity* establishes the correct operational measures for the concepts being studied. The tactics for construct validity are: A) to use multiple sources of evidence (data triangulation). B) Establish chain of evidence in order to allow an external observer to follow the derivation of any evidence. C) Have key informants to review a draft of the case study report, which means that the report not only should be reviewed by peers but by the participants and informants in the case. Tactics A and B are especially relevant in data collection phases and tactic C in the validity phase.

*Internal validity* serves as the test to check a causal relationship as distinguished from the spurious relationships. The tactics to increase internal validity include all relevant efforts to ensure the quality of data analysis phase, and they are: A) Pattern matching; B) Explanation building; C) Logics models. Also, *external validity* means establishing the domain to which a study finding can be generalized. The tactic is to use theory and is relevant in the research design stage.

The final tactic for ensuring the quality of a qualitative study is to increase *reliability*, which means demonstrating that the steps and operations of a study can be repeated, with the same results. The tactics suggested for reliability are A) the use of a case

study protocol and B) a case study database. These tactics are also relevant in data collection for this study.

In this study, to ensure *validity*, the following steps are planned to be taken. First, multiple sources of evidence are being used, such as documentation, interviews and, observations. Second, the models are planned to be tested. Third, literature available about the topic is searched for well-established best practice and available knowledge to enhance validity of the study.

In this study, to ensure *reliability*, the following steps are planned to be taken. First, the use of case study protocol with several sources of evidences. Second, the case study database will provide access to the raw data to be inspected. Third, face-to-face interviews with almost all stakeholders from CSC in Helsinki. Interviews and e-mail follow up with the manager in CSC the NL (see Appendix 5). Fourth, analysis of documentation in the NL and Helsinki (see Appendixes 1, 2 ,3 and 4). Finally, the researcher is not a member of the unit that excludes the researcher bias.

### 3 Current State Analysis

This section discusses how the company is currently working. This section first looks at the current practices related to price lists management in two locations. Then, it analyzes the strengths and weaknesses of these practices. Finally, it summarizes the main findings to be addressed.

#### 3.1 Description of the CSA Stage

The objective of this stage is to understand the current process and identify its stakeholders. In this stage, Data 1 was collected consisting of observations, documentation analysis, and interviews with three departments: engineering, sales and CSC. With the information coming from Data 1, the current process was mapped.

Next, based on the analysis of the current practices, the list of the findings is identified and discussed in the CSA of the study. According to the scope of the study, the CSA is evaluated only in Helsinki and the Netherlands.

In Helsinki, the first process observed was *the invoicing process*. During the observations, the stakeholders explain the issues faced daily when performing this process. In the course of the interviews and observations, stakeholders of the process are identified. Interviews with AMs and CSC representatives are performed as well as a meeting with engineering in one of the factories the company owns. Another important input on this stage is the analysis of the documentation available in the company.

Based on the findings, a map of the current (real) process is created and discussed with the stakeholders. Helsinki office does not have a map of the process but the unit has a manual with instructions about how to deal with different situations. Therefore, these manual instructions about prices and invoices are scrutinized as part of analysis of the internal documents (available in Appendix 3). Additionally, a process related with prices is found in the sales office (available in Appendix 1). The invoicing process is also mapped to visualize where the main issues arise.

In the Netherlands, interviews and observations are done by using Lync meetings and followed up by e-mails. This office has a well-documented process about how to update prices (shown in Appendix 2). A map of the current invoicing process was developing to be compared with the process in Helsinki.

Finally, compilations about the two processes were done to identify the S&W of each process and key issues to be addressed.

### 3.2 Background of the Current Process of Managing Price Lists

The case company of this thesis has been growing by acquiring other companies in different countries. As the integration is not completed, internal processes are not yet fully unified. Consequently, each location may have some own practices, slightly different job descriptions, and preferred ways of doing things. Nevertheless, some functions have already been successfully unified. IT department makes a good example, this unit was able to unify its processes across the company as to provide support from Helsinki to the rest of the offices, in unified processes.

When it comes to the price list process, previous attempts to improve these practices have already been done. For example, *in Helsinki*, the price list process was developed four years ago within sales and CSC. Although much improvement has been done related to data quality available in the ERP, the unit still sees improvement to be done. Based on the results from the interviews, and the data observed (previous process) the agreed procedure is not followed by all the stakeholders leading to a malfunctioning.

*In the Netherlands*, the unit has developed a detailed procedure comprehending engineering, sales, and CSC. The unit follows the process and is satisfying with it. According to the unit, the process works as expected but problems arise when sales are made by sales offices from other locations than Netherlands. In some cases, the unit is not informed about at what the prices the products are sold and CSC has to contact the AM to inquire.

This study focuses on how prices are managed, which means how they are kept, updated and informed. The way and periodicity in which they are updated vary according with which element of the price is varying. Price itself can be divided in two

elements: the *base price* and the *special surcharges*. The base price is the price of the product itself, it is established by sales along with engineering and its value may change annually. On the other hand, *special surcharges* are the part of the price related to the price-evolution of raw materials and electricity. These prices follow the evolution of the price indexes published by certain industrial association. Customers negotiate with which index, or combination of indexes, prices are going to be updated. They also agree how often prices are going to be revised being this monthly, quarterly or annually. The value of the indexes is calculated by CSC representatives, mainly in Helsinki. CSC in Helsinki sends the indexes to AM and CSC from other locations to update the values for their customers. Although it is not necessary to negotiate prices with customers when the indexes change, it is needed to inform them about the new prices with the actual value of the surcharges.

Next, the current process of managing price lists is discussed in further detail on the example of two units, Helsinki and the Netherland offices, by mapping the processes, explaining the steps and, comparing both processes.

### 3.3 Current Process: Maps and Analyses

Based on the results of data collection from interviews, observations and the documents available in the company, two cross-functional process map were created. First, the process map and analysis of the price lists management in the Helsinki office. Second, the process map and analysis of the current practices in the Netherlands, to make it comparable with the process in Helsinki.

#### 3.3.1 Process for Price Lists Management in Helsinki

To analyze the process, two maps are drawn. The first map to be represented is the *price list management process* and contains two sub-processes when prices are registered and updated into the system (*recording and maintaining price process*) along with how prices are informed to the customers (*informing price process*). This process, with its corresponding sub-processes, is going to be explained with relevant examples. The *invoicing process* is the second process to be mapped. This process is fed by the *price list management process* thus; it helps to clarify some of the issues concerning with how the prices are managed in the previous process.

Three persons are working in the CSC in Helsinki (March 2016). This CSC handles around 180 customers and also gives support to the factories by invoicing their internal sales. Figure 2 shows the process in which prices recorded and maintaining into the company database in Helsinki. Numbers have been added to each activity to explain the process step by step.

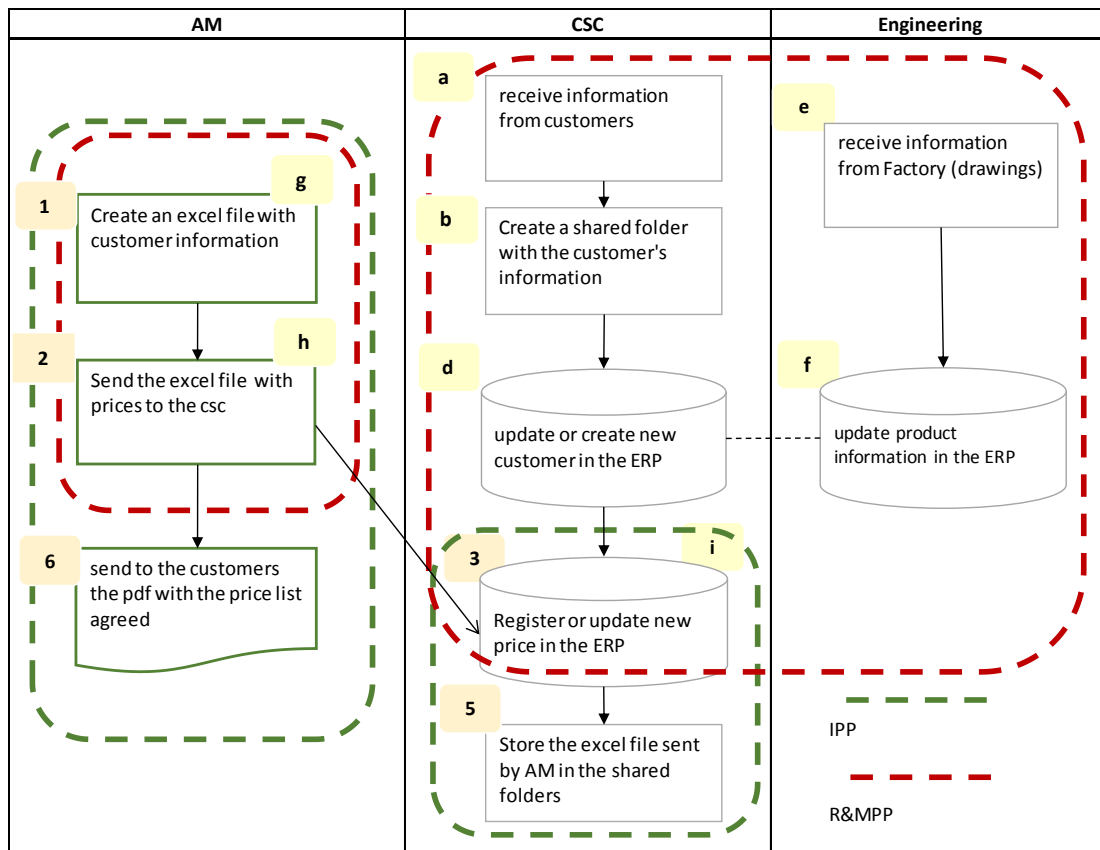


Figure 2. Price List Management Process Helsinki.

As it can be seen in Figure 2, the current process has three key stakeholders: (a) CSC, (b) engineering and (c) AM from the sales department, providing the inputs for adding prices in the company database. The current process also has two sub-processes, the *Recording and Maintaining Prices Process* (R&MPP) identified with red-dashed lines and, the *Informing Prices Process* (IPP) identified with green-dashed lines.

The process is conducted in the following sequence, as listed in Table 4 below.



step	Content	Stakeholder	Sub-process
a	Receiving information from customers	CSC	R&MPP
b	Creating a shared folder with digital information about the customer	CSC	R&MPP
c	Creating the customer in ERP	CSC	R&MPP
d	Receiving information from the plant	Engineering	R&MPP
e	Updating the product information in the ERP and creating the product part number	Engineering	R&MPP
f/1	Creating or updating an excel file with customer information	AM	R&MPP/ IPP
g/2	Sending the excel file with customer information to CSC	AM	R&MPP/ IPP
h/3	Recording or updating prices in the ERP	CSC	R&MPP/ IPP
4	Storing the file sent by AM in the Shared folder	CSC	IPP
5	Sending the prices to the customer in pdf format	AM	IPP

R&MPP: Recording & Maintaining Price Process

IPP: Informing Price Process

Table 4. Steps in the current Price list management process Helsinki.

Table 4 shows that in *step a* CSC receives the information from the customers. The information digitally available is stored in shared folders labeled with the customer organization's name in *Step b*. In *step c*, CSC creates the customer in the ERP. In *Step d*, engineering receives drawings from the plant. In *Step e*, engineering records the product information in the ERP creating the product part number which is fundamental to identify the product and is linked to the customer. In *Step f*, AM creates an excel file with the customer's information. In *step g*, AM send to CSC the prices for the new product. All these steps along with *Step h* where CSC records the prices linked with the product part number, shape the *recording & maintaining price process* (R&MPP). R&MPP process is performed completely as have been explained when a new product is introduced. Next, when prices change either *base prices* or *special*

*surcharges*, AM updates the Excel file containing the information of the customer and calculates the new prices according to the new values of surcharges or the agreed incremental *base price*. This is done in *Step 1*. In *Step 2*, AM send the information with the new prices to the CSC. In *Step 3*, CSC update the prices of values already existent in the ERP. In *Step 4*, CSC stores the files sent by AM in the shared folders in the customer file. In *Step 6*, AM send the excel file in pdf format to the customers. All steps from 1 to 5 conform the *Information Price Process (IPP)* which is performed monthly, quarterly or annually according to agreement with the customers.

In *Step 1*, when AMs create or update the information about prices to send to CSC in step 2, each stakeholder do it in its own template. Every list received by CSC representative has a different layout. To illustrate differences in price lists, several list are gathered and are shown in Figure 3.

Figure 3. Examples of price list templates Helsinki.

Figure 3 above shows that every price list has a different layout and different information. In many cases, the lists do not have the internal part number that is vital to identify the product. Some list also contains additional information with complex links and formulas, several hidden columns and rows.

In Step 3, when CSC representative updates the new value of surcharges in the ERP, they do it by updating the new value of indexes. Automatically, the system calculates the new price for the products according to its weight. There are differences between the values calculated by Excel used by AM and the values calculated by the system. These differences are usually around 0,10 or 0,20 cents although in some extreme cases may be higher as the examples shown in Table 5.

Table 5. Examples of differences in the ERP and prices given to the customer.

Final price SAP	2015 Excel pricelist given to customer	Difference
69,66	67,47	3,25 %
35,89	31,80	12,86 %
30,69	30,04	2,18 %
124,48	119,88	3,84 %
27,47	26,13	5,13 %
20,99	20,17	4,09 %
17,62	16,92	4,17 %

Table 5 above illustrates some of the discrepancies between values in the company database and values agreed with the customers. Column 1 shows the values in the ERP (SAP), column 2 shows the values given to the customers and, column 3 shows the percentage of differences among them.

Summing up, the price list process management can be divided in two sub-processes: *record and maintaining price process* and *informing price process*. The R&MPP is performed totally when a new product is introduced and partially when prices are changing. The IPP works completely in both cases, when a product is introduced and when prices change, with the only difference that in the first case the information is recorded and in the second case when prices change, they are modified. Additionally, there are differences in the layout and information in the templates utilized to inform prices. Furthermore, there are differences in the values recorded in the systems comparing with the prices informed to the customers.

Next, in addition to the *price list management process*, the *Invoicing process* are also mapped in Helsinki. This process fed by the *price list management process* previously depicted and, is in this process where most of the problems are spotted. Figure 4 illustrates the *invoicing process* in Helsinki.

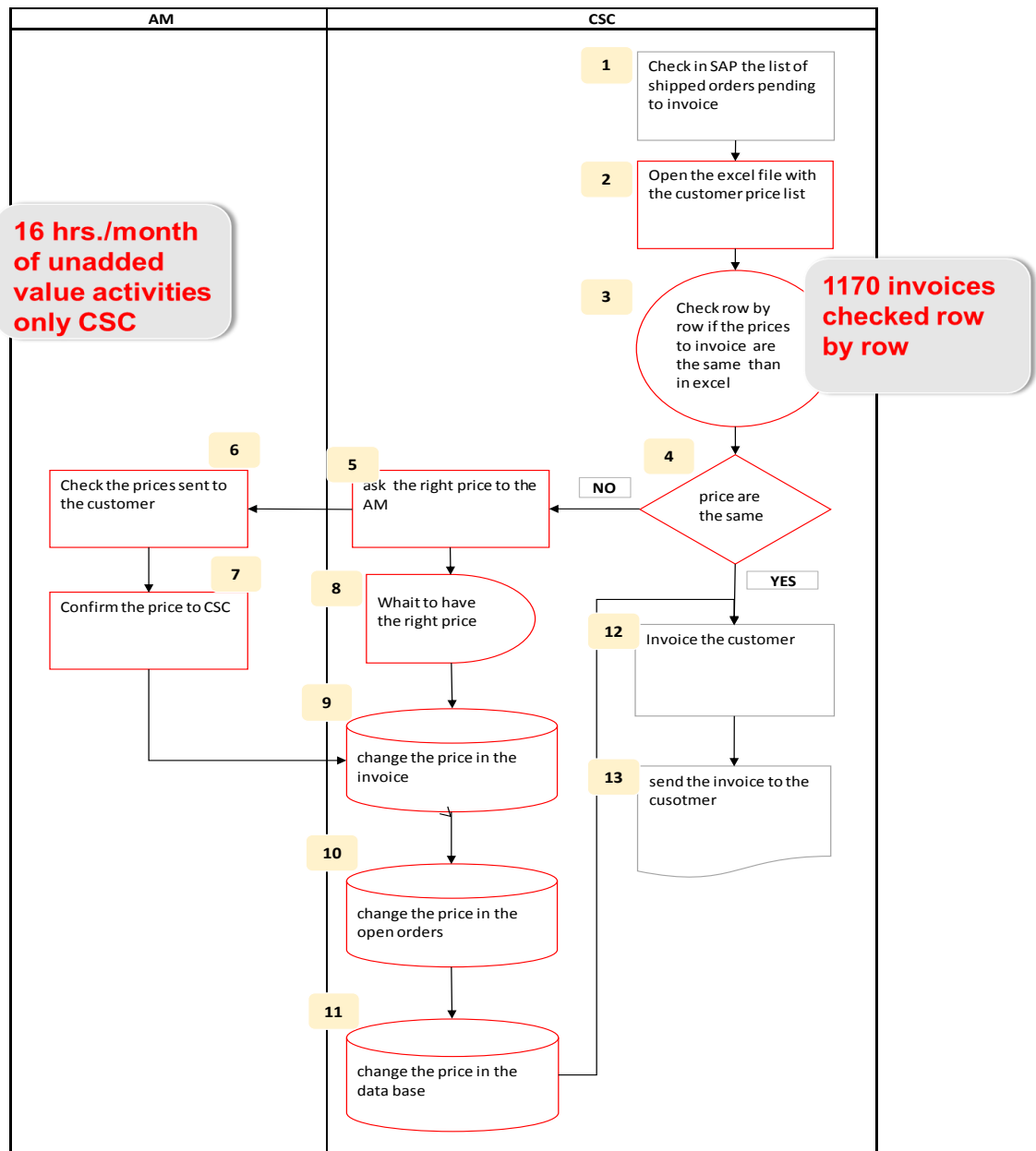


Figure 4. Invoicing process Helsinki.

Figure 4 shows that the current invoicing process have two stakeholder: (a) CSC and, (b) AM. The process is conducted according to the steps listed in Table 6 below.

Table 6. Steps in the Invoicing Process in Helsinki.

Step	Content	Stakeholder	process type
1	Checking in the ERP the shipped orders pending to invoice.	CSC	
2	Open the excel file of the customer to be invoiced with the last price informed	CSC	NVA
3	checking all the prices of each product to be invoiced against the prices in the excel.	CSC	NVA
4	Compare if prices are the same.	CSC	NVA
5	If prices are different, ask the right price to the AM	CSC	NVA
6	Checking which prices sent to the customer.	AM	NVA
7	Confirming the prices to CSC	AM	NVA
8	Waiting time C to get the right price	CSC	NVA
9	Change the value in the invoice.	CSC	NVA
10	Change the price in the open orders.	CSC	NVA
11	Change the price in the data base.	CSC	NVA
12	Invoice the customer.	CSC	
13	Send the invoice to the customer.	CSC	

NVA Non value Added Activity

Table 6 shows that the steps in the invoicing process are: *Step 1*, CSC checks the shipped orders pending to invoice. In *Step 2*, CSC opens the excel file with the last information about prices available in the shared folders. In *Step 3*, CSC checking row by row all the products to be invoiced in the order with the prices in the excel. In *Step 4*, CSC compares if prices sent to the customers and prices about to be invoiced are the same, if prices are different, AM should be consulted about the right price in *Step 5*. In *Step 6*, AM check in the files the last price informed. In *Step 7*, AM confirms the value to CSC. Step 8 represent the waiting time by CSC until the answer of the right price is received and can be up to two days. In *Step 9*, CSC changes the value in the invoice. In *Step 10*, CSC changes the value in the open orders of the customer. In *Step 11*, CSC changes the price in the database. In *Step 12*, CSC invoice the customer. In *Step 13*, CSC sends the invoice to the customer.

In Table 6, all the steps that can be avoided if the information is correct in the database are marked in red letters and as NVA activities (column 4). Similarly, in Figure 4, these processes have been depicted in red.

To summarize, in the *invoicing process* recently illustrated, it is where most of the problems coming from previous process are visible. Invoices are performed daily at the CSC in Helsinki. The unit performs around 1.170 invoices per month (CSC Helsinki January 2016) and estimates 16 hours per month spent in this non-added value activities, only considering the time consumed by CSC representatives.

### 3.3.2 Process Price Lists Management in the Netherlands

To analyze the process in the Netherlands, two maps are developed. The first map consists of an adaptation of the current map the unit possesses (available in Appendix 2) that can be analogous to the *informing price process* in Helsinki. The developed process is called *the price list management process NL*. The second map consists of an *invoicing process* for the Netherlands.

The CSC in the Netherlands handles around 170 big and small customers. There are five persons working in this CSC (February 2016). In the *price list management process NL*, two sub-processes can be identified. First, a process where prices are recorded or updated when a product is introduced or when prices change respectively, this process is called the *Recording and maintaining price list process*. Second, a process where prices are informed to customers, and it is called the *Informing price process NL*. These two sub-processes are specified in Figure 5 below.

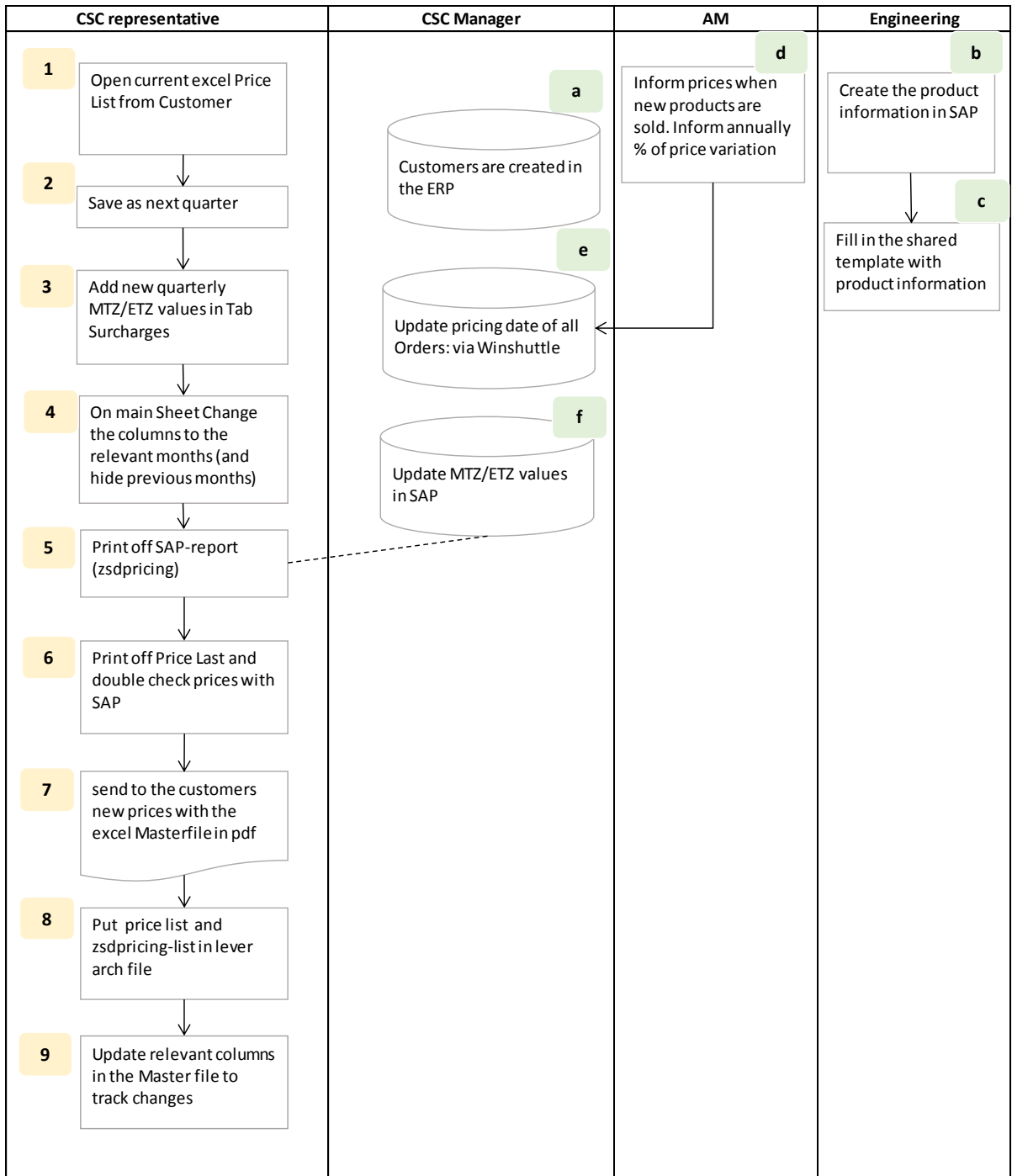


Figure 5. Price List Management Process in the Netherlands.

Figure 4 shows that two sub-processes are identified in the map. In the R&MPP, the steps are identified with letters and the stakeholders are: CSC Manager, AM, and engineering. Additionally, in the IPP process, the stakeholder are CSC representatives. The steps of the process are conducted as indicated in Table 7 below.

Table 7. Steps in the price list management process NL.

step	Content	Stakeholder	Sub-process
a	Create customer in ERP	CSC Manager	R&MPP
b	Create the product part number in ERP	Engineering	R&MPP
c	Update the NPI form with the product information	Engineering	R&MPP
d	Updating the NPI template or updating the template to inform % of changes	AM	R&MPP
e	record prices or update prices in ERP	CSC Manager	R&MPP
f	Update prices of MTZ/ETZ	CSC Manager	R&MPP
1	Open the master price list file for the customer.	CSC	IPP
2	Save it as the next quarter.	CSC	IPP
3	Add the new values for surcharges in the corresponding sheet.	CSC	IPP
4	In the main sheet, change the columns of the relevant months and hide the previous.	CSC	IPP
5	Print the values from SAP.	CSC	IPP
6	Check the values in the master file against the values from SAP.	CSC	IPP
7	Make corrections if needed. Save the excel file in pdf. Send it to the customers.	CSC	IPP
8	Save both files in the lever arch files.	CSC	IPP
9	In the master file, update the sheet informing about the changes.	CSC	IPP

R&MPP: Recording & Maintaining Price Process

IPP: Informing Price Process

Table 7 shows, in Step a, that CSC manager creates the customer in the ERP. In Step b, engineering creates the product part number in the ERP. In Step c, Engineering updates the shared NPI template (template is in Appendix 4) where several departments introduce all the information about the product. Step d, AM inform the new prices in the agreed template or the % of changes in base price. In Step e, CSC



manager records or updates prices in ERP. In Step f, CSC manager updates values for the special surcharges MTZ/ETZ. All these steps shape the R&MPP and are performed when a product is introduced or when base prices change.

Next, for the informing prices process, CSC representatives open the excel Masterfile price list of the customer in Step 1. In Step 2, they save the file as the next quarter. In Step 3, they add the new values for special surcharges in the corresponding sheet. In Step 4, in the main sheet, they add the columns for the current month and hide the previous month. The excel model calculates the new values for the current month base on the new values for special surcharges added in Step 3. In Step 5, CSC prints the values from SAP. In Step 6, the values from SAP are compared with the values in the master file. In Step 7, corrections are made if needed and the excel file is saved in pdf and sent to the customer. In Step 8, both files (the excel Masterfile and the print form SAP) are saved in the shared files. In Step 9, in the excel Masterfile CSC inform about changes made, that is that the prices have been inform to the customer and prices are up to date.

In this location, the invoicing process was also mapped. Invoicing is performed daily in the Netherlands and the monthly amount of invoices is around 1000 invoices. In most of the cases, the unit does not experience problems with this process except when sales are done for AM that are not aligned to the Netherland's process. The process is depicted in Figure 6 below.

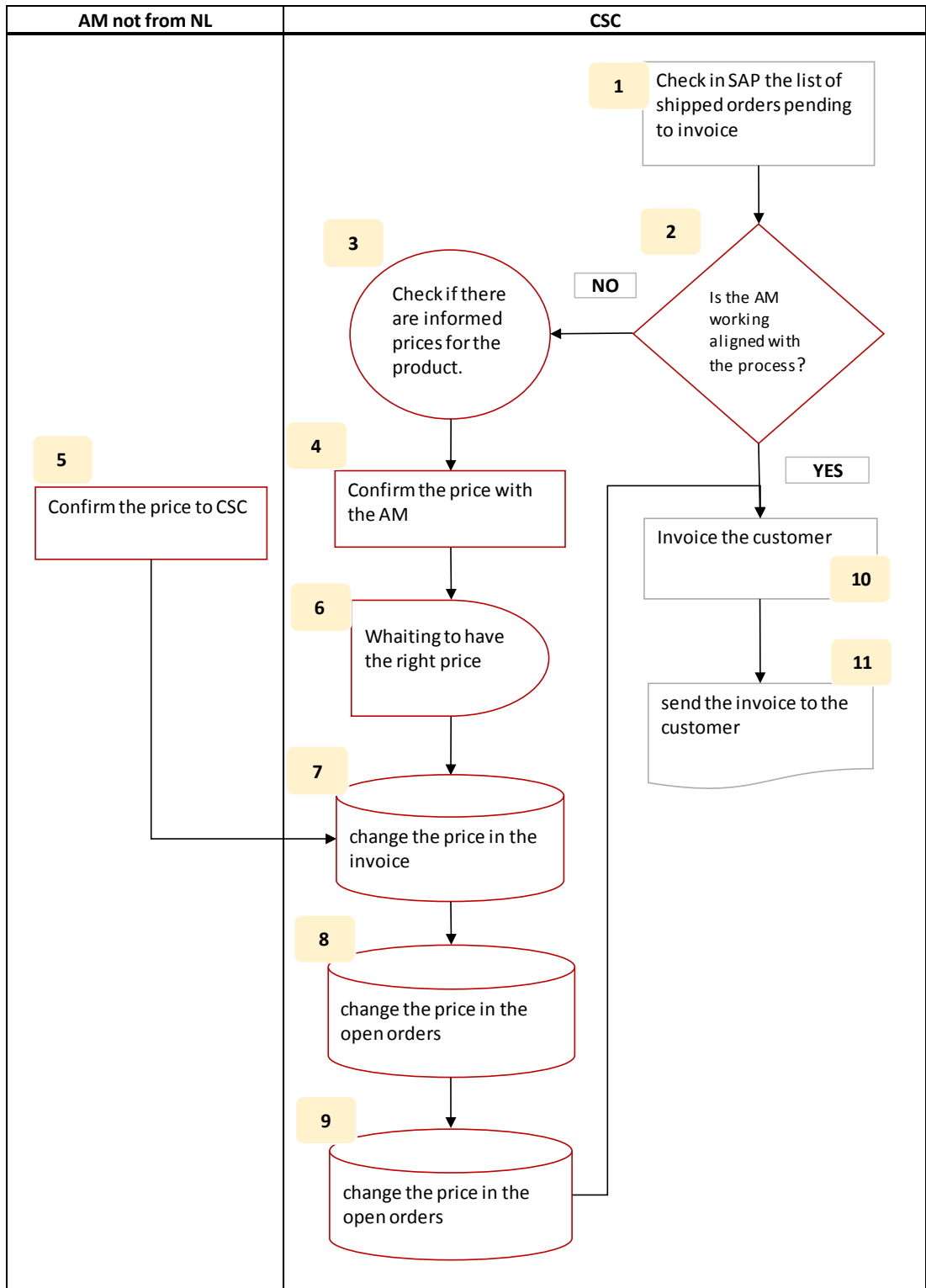


Figure 6. Invoicing Process Netherlands.

Figure 6 shows that the stakeholder for this process are CSC representatives and AM. The steps are conducted as explained in Table 8.

Table 8. Steps in the invoicing process in the Netherlands.

Step	Content	Stakeholder	process type
1	Check in the ERP the list of the orders shipped pending to invoice.	CSC	
2	Is AM for the product align with the process? If yes, step 10 follows, if no, step 3 follows.	CSC	NVA
3	check if prices have been informed.	CSC	NVA
4	confirm the prices with the AM.	CSC	NVA
5	confirm the prices to CSC.	AM	NVA
6	waiting time for the answer.	CSC	NVA
7	Change the value in the invoice.	CSC	NVA
8	Change the price in the open orders.	CSC	NVA
9	Change the price in the data base.	CSC	NVA
10	Invoice the customer.	CSC	
11	Send the invoice to the customer.	CSC	

NVA Non value Added Activity

Table 8 above shows that Step 1 consists of checking the shipped orders pending to invoice. Step 2 consists of finding out if AM who sold the product is aligned with the process. If AM is aligned, then the Step 10 is followed. If AM is not aligned, then it is needed to check if prices have been informed in Step 3. In Step 4, AM is consulted about the prices. In Step 5, AM informs the right price. Step 6 represents the waiting time to receive the answer from AM. In Step 7, values are changed in the invoice. In Step 8, the values in the open orders are changed and in Step 9, prices are changed from the database. In Step 10, the customer is invoiced. In Step 11, the invoice is sent to the customer.

In the invoicing process for the Netherlands, similarly to the analysis in Helsinki, the activities (that can be avoided if other steps are performed differently in previous processes) are highlighted in red and identified as non-value added activity (NVA) in Table 8. Most of the invoices the unit performs are from sales done by AM from NL. Consequently, in most of the cases, the process has only three steps instead of the eleven, as shown in Figure 6 and Table 8.

### 3.4 Analysis of the Current Processes (Data Collection 1)

Both locations work differently. On one hand, in the Netherlands, they have an agreed process and the unit works according to it. On the other hand, in Helsinki, there are no procedures and each stakeholder has its way to perform the tasks. Each of these two different approaches has advantages and disadvantages. Anyhow, there are also some common findings. To analyze the current processes first, the common points are determined. Secondly, the particular findings for each location are also explained. Finally, a summary of all the findings is displayed.

### 3.5 Key Findings from Comparison of Price List Management in Two Units

From the processes depicted before, common findings are identified as well as unit-specific findings. Firstly, common findings are explained. Secondly, findings from the Netherlands are presented, followed by the specific findings for Helsinki.

#### *A. Common findings*

First, the information about prices is not kept in a reliable database. In the Netherlands, prices are known by the CSC but the master data of prices is the excel file. On the other hand, in Helsinki CSC the information about prices is not certain. The valid information is the one available in AM personal database.

Second, the company has a robust ERP. Even though some users claim that it is complex to use, others have a deep understanding of it and can size the benefit of it.

Third, both locations have differences with the prices informed to their customers and the prices in the ERP. While in Helsinki the differences in prices are both, large and small, in the Netherlands, the differences are usually small. Consequently, both CSC have some differences with the amount invoiced to the customers and the amount informed to them. While the cause of the large differences is due to a lack of actualization of prices to customers or misinformation of prices from AM to CSC, the root cause for the small differences lies in the source form where prices are informed

to the customers, and from where the invoices take the values. In both CSC, prices informed to the customers come from a calculation done in Excel, while invoices take the values from the ERP. Both systems SAP and Excel operate differently, consequently the values coming after an internal operation may vary in small amounts, such as 10 or 20 cents.

Figure 7 illustrates the two processes, side by side, showing the source from where information is taken to inform the prices and for invoicing.

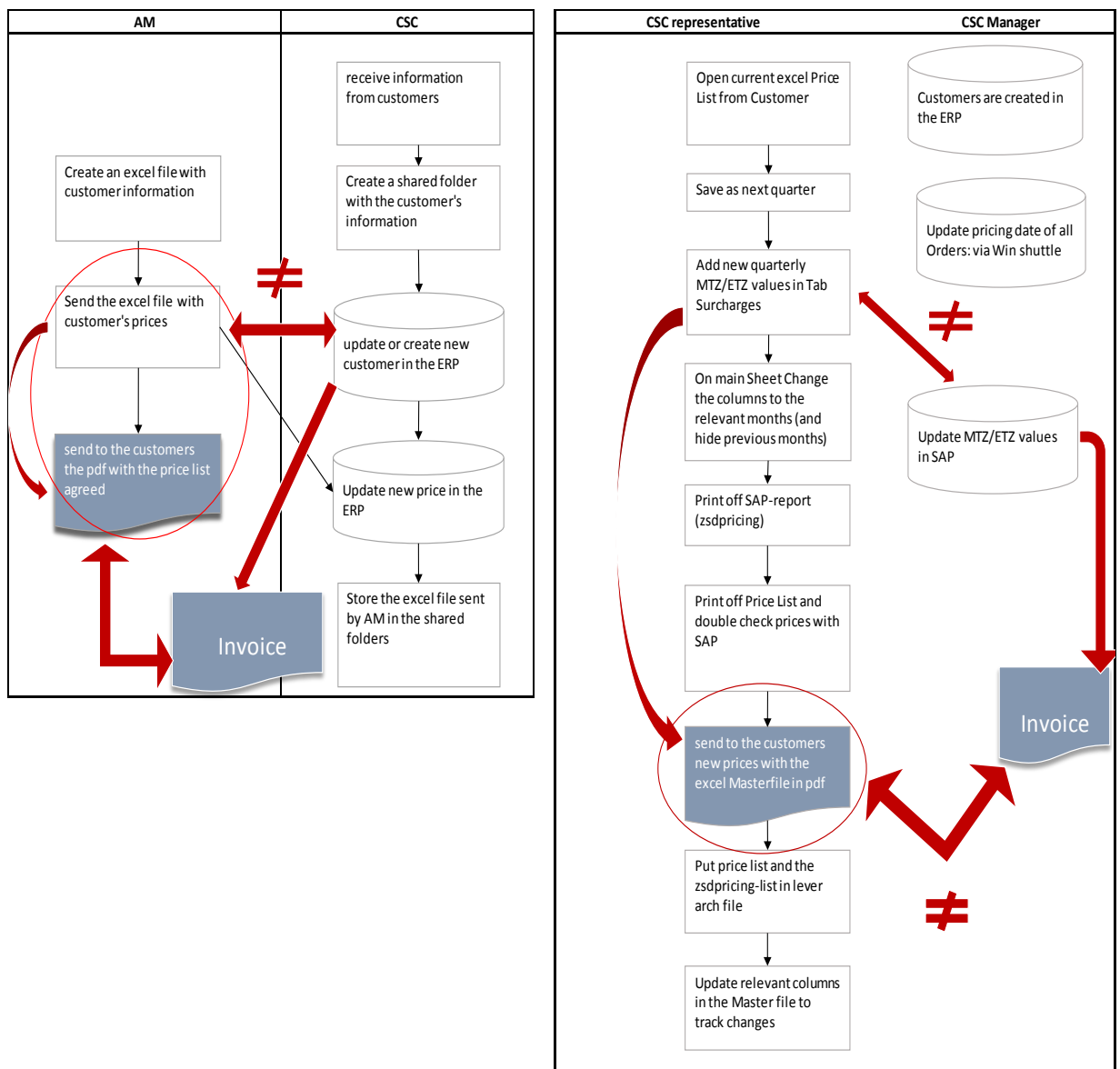


Figure 7. Analysis of source of information for informing prices and invoicing.

As shown in Figure 7 above, the different sources for extracting the information lead to differences in the values invoiced versus the values informed to the customers.

Fourth, each CSC possesses a different philosophy to address the same problem. As it has been mentioned before, some invoices are different when comparing with the informed values. Although these differences are small, some customers complain. While in Helsinki these differences are corrected, in the Netherlands the unit does not correct them. One of the CSC representatives in Helsinki stated that:

*“We have had to correct around 100 invoices with 10 cents differences, each from a customer during January as the customer argued that it was not the agreed price, and he was right....”*

- CSC representative Helsinki

In Helsinki, even small differences are corrected when the customer requires it. On the other hand, in the Netherlands, the unit tracks these small differences differently. As it was said by a stakeholder in Netherlands:

*“Some customers complain about the differences but as they were only 10 cents we keep sending the invoices with these small differences and the customer stop complaining.”*

- CSC representative Netherlands

This citation shows that in the Netherlands these differences are not corrected due to being small amounts.

Fifth, although it may seem insignificant, the way of naming the same department may vary in different locations. For example, Customer Service Center is also called Sales back office. Another example is how the factories are named. Whereas some locations name the factories with its actual name, others use the number given by the system to refer to them.

Sixth, locations do not share their concerns, inquiries or good practices with other locations.

Seventh, both locations have a different process with different job descriptions. When in Helsinki the process is tacitly known, in the Netherlands the process is written and this written description is followed. Whether the process is formal or informal, both processes vary in substantial parts. Sub-processes of the main process are performed by different departments. In other words, in the Netherlands, CSC informs

the customers about changes in special surcharges, when in other location this information is given to the customers by AM.

To sum up the common findings, although the company possesses a robust ERP, it is not utilized to keep the information. In both locations, there are differences in the prices informed to the customers and the prices invoiced to them. Additionally, the units have a different approach to address the same issues. Finally, changes in special surcharges are informed in Netherlands by CSC, while in Helsinki this information is given by AM.

### *B. Findings from the Netherlands*

First, the Netherlands unit possesses a procedure, and the unit works methodically sticking to it. This procedure allows the NL unit to have control over prices. According to this procedure, they perform tasks that at other locations are performed by AM. CSC representatives are in charge of keeping updating the customer with the new prices.

Second, NL CSC possesses several templates in Excel. The unit utilizes Excels as support documents to automatically update information in the database. Also, Excel files are used to maintain the evolution of prices and track changes in the master files.

Third, IT service is located in Helsinki and is the office that provides support with SAP issues. The NL unit receives support by e-mails or by Lync meetings and, although they are satisfied with the assistance provided by IT, there is room for improvement in the way they exploit the ERP (SAP). As one interviewee expressed it:

*“We did not know about the SAP list until you told us about that few weeks ago...”*

- CSC representative Netherlands

Thus, several features of the ERP can be utilized in a more efficient manner.

Summarizing the findings in Netherlands, there is a uniformed way to perform tasks within the unit. Additionally, the unit uses the support of Excel files to checking and tracking the changes in information done in the ERP.

### C. Findings from Helsinki

First, at the Helsinki unit, checking is required before invoicing. The values to be invoiced have to be checked row by row. Each invoice has several products and the value for each product has to be checked. The checking is against the values AMs have sent to the customers.

Second, checking prices is a time-consuming activity. When checking price differences, it may be hard to find the product part number. Some lists lack this information; hence, the checking has to be done identifying the product by other means. Understanding the several different layouts of price lists received by CSC may be confusing (see Figure 3). Some lists may be composed by Excel models with hidden rows and calculations useless for the purpose of price updating. All this extra information makes the lists unclear. As one CSC representative said:

*“After being dealing with this list for years, I’ve just realized that when the column of value is empty, I have to update with the previous value, which is in the hidden column....”*

- CSC representative Helsinki

This statements gives the idea of how confusing the different lists may be. CSC receives several lists coming from various AM and even experienced stakeholders find difficult to interpret them.

Third, there is not a shared way to perform the task consequently, everyone has its way to work. In this location, one of the CSC representative has a different way of working. The stakeholder has trained the AMs that work with the same customers the stakeholder serves to take the values from the ERP instead of the Excel file and to inform the customers the new values from this source. By working this way, there is no need to check the values before invoicing.

*“I have taught all the AMs how to print out the information from the SAP and agreed with them that they will send the prices from the system. I have been able to do so since I only work with AMs from Finland....”*

- CSC representative Helsinki

This testimony shows the significant expertise and understanding of the process and how to improve it from some of the stakeholders.



Fourth, many AMs are unfamiliar with the use of SAP. Sales department operates with its own system and consequently some AM lack of suitable training about how to use it. Additionally, AMs argue that it is needed to memorize codes of customers and the layout of the system is not very friendly. Furthermore, some AMs also suggest to add more fields in the lists to include relevant information that otherwise they have to add manually.

Fifth, all the documented procedures have not been updated for a long time, some of them have more than 10 years. Most users do not know they exist.

Sixth, there is no common code to label and keep information. There is also no rule indicating which information can be stored in the shared files. Also, a mutual agreement how to name the files is missing. Finally, there are no responsible persons appointed for the information stored in those files. All these issues regarding to storage and labeling of information lead to having information either not used or not known to be in the shared files.

To summarize, the findings exclusive to the Helsinki unit include: First, there is a need to check values before invoicing. Second, doing the checking may be confusing due to the different layout and information available in lists used to inform prices. Third, some AMs do not want to use the SAP. Fourth, there is not a written procedure nor a common way to perform the tasks and keep information. However, there is a great understanding of the process and uses the ERP from some of the stakeholders.

### 3.6 Insight from a Purchaser (Outside Perspective, Data 1)

Based on the interviews with the outside purchaser, in which the Helsinki and the NL units practices were discussed, mistakes in invoices also affect the customers. To obtain an overview on how it can affect them, two interviews were conducted with purchasing specialists from two major customers from the case company.

Customer 1: Their system allows them to pay when differences are small, as few cents, without further procedures. When the differences are bigger than that, they need to check the reason for the difference and, if it is not the agreed price, a credit for the difference is required from the provider.

Customer 2: Their system also contemplates to have some small differences. On the other hand, when the differences are considerable, they have to track the roots of them and solve them. They have identified that these kind of problems are sources of extra expenses to the company. Thus, they have decided to analyze the customers that have mistaken in their invoices to require improvements from them.

*“As a purchaser, I have to say that it is very annoying to get invoices with the wrong price....”*

- Purchase Specialist

This statement leads to infer that even customers contemplate small differences; the agreed value is the expected value.

To summarize the main findings from the perspective of the customers, invoices should have the agreed value. When the invoiced value is not the agreed one, customers should use their resources to track causes of differences and require corrections.

### 3.7 Summary of Key Findings from CSA

Several findings are coming from the CSA. All the findings are summarized separating the common findings from the exclusives findings from each location. Table 9 summarizes all the findings from the CSA

Table 9. Summary of findings from CSA

	<b>Description</b>
<i>Common Findings</i>	
1	Lack of security and accessibility in how prices are storage
2	Robust ERP
3	Differences in values in ERP vs quoted / differences in invoices
4	Different approach to address the same problem
5	Different names for same things
6	Not sharing good practices or inquires
7	Different Job description within the same process
<i>Findings from Netherlands</i>	
1	Possession of a process and methodical way to work
2	Support on spreadsheet
3	Possibility to enhance the use of ERP
<i>Findings in Helsinki</i>	
1	Need to check values before invoicing
2	Not agreed template to inform prices
3	Different way to do things within the same location with great expertise of some stakeholders
4	Lack of trainee of some AM about how to use the ERP
5	Not up to date process
6	Lack of methods to keep and label information

Table 9 shows, first, the common findings relate to the lack of security and difficulty to access to price information. Second, the case company possesses a robust ERP (SAP). Third, there are differences in values of prices informed to customers and values recorded in ERP, which leads to differences in invoices. Fourth, each location has a different approach to address the same issue. Fifth, both locations utilize different names to address the same department. Sixth, there is not a culture of sharing concerns or good practices with other locations. Seventh, tasks performed by the same department in different locations are different.

Additionally, the findings from the Netherlands, first, point that the unit does have a shared and agreed process, and the unit follows it in a methodical way. Second, spreadsheets are commonly used to support the control and cross-checking of tasks. Third, there is a possibility to enhance the utilization of the ERP. Third, as there is no

common process to do the tasks, each stakeholder has its own way to work, with some having considerable experience on the process and the use of the ERP. Fourth, there is a lack of suitable training from how to use SAP in some AM. Fifth, although some written procedures have been found in the location, most of them either not in use, or not up to date. Sixth, there is no common method to label information and store it.

From the findings discussed above, the most relevant to the objective of this study are chosen to be addressed in the next steps. Table 10 below summarizes them.

Table 10. Summary of the key findings from the current state analysis.

N	Findings	Description	Source	S / W
1	Robust ERP system	1.The Company had invested in a reliable ERP system (SAP) that is available in every location	Fact	S t r e n g t h s
2	<b>Netherlands:</b> Methodical way to work and follow a process	2. Stakeholders shared and follow a process that allows to keep the control over prices	Interview / Observation	
3	<b>Helsinki:</b> Deep knowledge of the system and process	3. They have a great knowledge of the system. They are aware of the problem and want to improve it	Interview / Observation	
4	Lack of a common process	<p>1. Lack of security and accessibility in how prices are storage</p> <p>2. Different Approach to address the same problems</p> <p>3. Differences in prices available in ERP and the prices quoted to the customers</p> <p>4. Different job description within the same process</p> <p><b>The Netherlands</b></p> <p>5. The master data is the one stored in spreadsheets</p> <p><b>Helsinki</b></p> <p>6. The value quoted to the customers is known and kept by AM</p> <p>7. There is not a common way to do the same task in the same location</p>	Interviews / Observation	W e a k n e s s

Table 10 shows that the findings are divided into four categories: (a) related to the ERP system, (b) related to the Netherlands office, (c) related to the Helsinki office, (d) related to the needs for improvement in order to create a common, ERP-base process for two units. Additionally, the findings are also divided into *the strengths (S)* and *weaknesses (W)*. The first three findings relate to the strengths of the process. Although there are several weaknesses, all of them point to the lack of the common process.

In the fourth category, *lack of the common process*, first, *lack of security and accessibility in how prices are stored* is one of the most urgent findings to be addressed. Second, the differences in how similar issues are addressed. Third, the differences in the prices informed to the customers and the values in the ERP. Fourth, the different tasks performed by the same department (CSC) in the two locations. Fifth, the master data is storage in spreadsheets in the Netherlands. Sixth, the values informed to the customers are known and kept in the AM personal database. Seventh, there is not a common way to perform the tasks within the same location.

Next section concentrates on the available knowledge and best practice to tackle the issues identified in the CSA.

## 4 Conceptual Framework

The purpose at this stage of the study lies in finding the best practices to address issues such as the found in the CSA. The main topics for this study are Business Process Management (BPM), Knowledge Management (KM), Data and information Quality and Integration-Responsiveness Framework. The outcome is to present a conceptual framework for the study.

### 4.1 Business Process Management

The belief that work can be seen as a process and improved evolved to become what is now known as Business Process Management. The first attempts to improve processes was through the simplification of tasks and manufacturing process proposed by Taylor and Ford at the beginning of the XXth century. With the contribution of statistical controls, the work simplification movement shifted to the Quality Control movement. Quality control concepts stressed out not only on measuring but also on reducing variation and continuous control. Japanese firms enriched the Quality Control concepts adding the discipline to put in place continuous improvements programs. (Davenport et al. 2006: xiii). This movement is known as Lean Manufacturing that by combining processes analysis, and a program of organizational reward, moved to what is known as Six Sigma. Later on, companies focusing on the overall performance of the firm added the alignment with the strategy and management of employee, stressing about innovation to gain a competitive advantage. Another variation of the original movement empathizes the use of technology to automate and improve work processes. (Harmon 2015).

Figure 8 below depicts the different streams that lead to the contemporary concept of BPM.

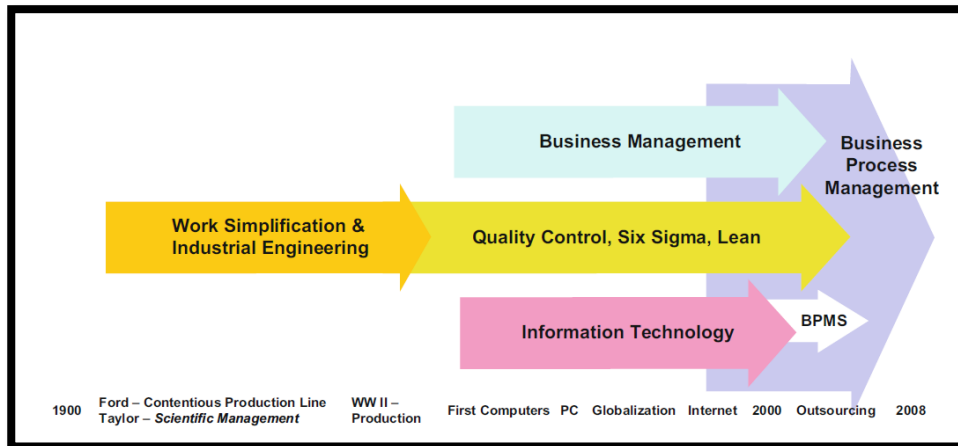


Figure 8. Overview of Business Process Change (Harmon 2015:39).

Figure 8 above shows that BPM derives from several movements such as work simplification and Industrial Engineering; Quality control, Lean and Six Sigma, business management movement and, Information Technology

Next, some definitions are presented to understand the concept of Business Process Management. First, Hammer defines Business Process Management as:

*“an integrated system for managing business performance by managing end-to-end business processes.”* (Hammer 2015: 3)

Also, Panagacos gives another definition referring BPM as:

*“The discipline of promoting business effectiveness and efficiency through the use of a globally recognized methodology.”* (Panagacos 2012: 120)

Finally, Harmon presents the third definition, saying that BPM is:

*“a management discipline focused on improving corporate performance by managing business processes of a company”.* (Harmon 2005, cited in: Jeston and Nelis 2006:11)

Considering the above mentioned definitions, it can be said that BPM consists of a managerial field aiming at improving performance by managing business processes. Throughout managing and redressing processes, companies can reach a broad range of benefits going from profitability, quality and speed to merger integration with ERP systems (Hammer 2015).

On the other hand, a process is defined as all the activities comprised to provide someone with what they expect to receive. This latter definition covers the end-to-end

nature of a process. For a process to be complete, it has to deliver a service or product to another internal or external process. Burlton (2001:72) cited in Jeston, J. and Nelis J. (2006:10). Additionally, Hammer describes business process as “*work that runs from end to end across an enterprise*”. (Hammer 2007:111). He also clarifies that “*all work is process work*” to avoid the misinterpretation that links process with automatic or routine work, creative work, for example, is also a process. (Hammer 2015). The creation of a formal process is the starting point to the process management cycle. Figure 9 below illustrates the concept of the process management cycle.

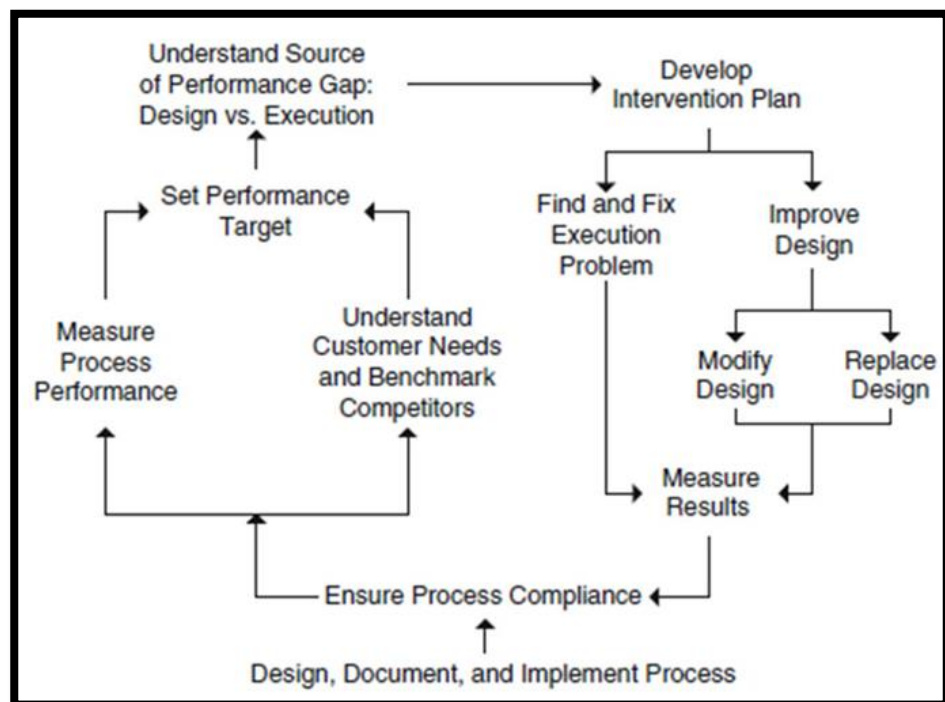


Figure 9. The essential process management cycle. Hammer (2015:5).

Figure 9 shows how companies manage performance. The process management cycle implies the conscious management of end-to-end business processes. Through this cycle, all value is created. (Hammer 2015:6). Having the process in place is only the beginning of the cycle; then, the process needs to be managed steadily. Performance measurement assures the process meets the targets. If the process is not performing as expected, root-causes have to be identified. Causes of malfunctioning can be either deficient design or deficient execution. Deficient process design commonly produces a predictable pattern of errors. Deficient execution process produces occasional errors. If the cause of deficiency lies in execution, the specific root has to be identified and may be lack of training, insufficient resources, inadequate



equipment, and so forth. Once the cause of deficient execution is identified, the solution is easy to implement. On the other hand, when the reasons of shortcomings are deficient design, the solution is often complicated to implement. The solution to defect design process requires a comprehensive rethinking of the structure of the process. After implementing the new design and sizing the outcomes, the cycle starts again. (Hammer 2015). The cyclical nature of the process management helps companies operating with process management to reflect about changes. Performance measurement will alert when changes are needed. Additionally, process management fosters all kinds of improvement initiatives providing the adequate resources to solve the specific issue. (Hammer 2015).

There are several approaches to address BPM. Although each tradition bows on some techniques over other, nowadays there is a tendency on combining the various practices in a far-reaching proposal. Whichever is the approach chosen, some characteristics should be considered when analyzing and redesigning processes. The enterprise maturity model proposed by Hammer suggests that companies should develop two features to deliver sustainable high performance. These two characteristics are *process enablers* and *enterprise capabilities*. While *process enablers* belong to the process, *enterprise capabilities* pertain to the whole organization. (Hammer 2007). There are five process enablers and four enterprise capabilities.

*Process enablers* of BPM include, first of all, *Design* of the process. It specifies which people will perform what tasks, in what order, under what circumstances, with what information. Without design, there is only individual uncoordinated activities. (Hammer 2015). Next, there are the *Performers* which are the people who work in processes and need to have a comprehensive understanding of the end-to-end process and its goal. Additionally, performers need to possess teamwork and self-management skills. (Hammer 2015). The *Owner* of a process is a senior manager with the responsibility for the process across the organization as a whole. (Hammer 2007). The *Infrastructure* represents the support given by integrated information systems and aligned HR programs that contemplate career, training and the like. (Hammer 2015). Finally, *Metrics* consist of the measure the company uses to test the performance of the process. Metrics needs to be tight to the end-to-end results and coming from the company goals.

*Enterprise capabilities are: Leadership:* Introducing processes require the support and engagement of senior executives. Additionally, only a senior executive can allow the resources and changes that processes need. (Hammer 2015)

*Culture:* points out the values and beliefs that configure attitudes towards processes and business improvement. (von Brocke and M.Rosemann 2015: 118)

*Expertise:* Are the skills and methodology for process redesign. (Hammer 2007)

*Governance:* sets clearly roles and responsibilities to guide process-related actions. It defines and documents process management standards and controls. (von Brocke and M.Rosemann 2014: 114-115)

Each enabler and capability is a key factor to the success of BPM and has to be considered by organizations that aim at thriving with BPM. Enablers and capabilities supply an effective tool for companies to plan and evaluate process-based strategies. Enablers are mutually interdependent, in other words, if one of them is not in place, the other will not perform as expected. Additionally, not all the enablers are present with the same strength, if one of the enablers is underperforming, the whole process will perform at the same level even if the rest of the enablers have a superior performance. Moreover, having the five enablers strong enough is not sufficient for a process to deliver high performance. For a process to deliver high-performance, a company must provide the four capabilities. Comparably with the enablers, capabilities are also interdependent and have to reach all the degree of intensity to support the process performance. The process enablers and the company capabilities conform the Maturity Model for processes and enterprises proposed by Hammer. It brings the opportunity to evaluate which degree of maturity each enabler has to implement action to bring the process to the next level. Likewise, the enterprise should evaluate the degree of maturity of each of its capabilities to foster reaching the next step. (Hammer 2007).

#### 4.1.1 Process Management in Six Sigma

There are different methods to address the application of BPM. The favor in the election of one of them over another is related to the purpose, the scope or the lifecycle of the process. Lean Management and six Sigma are methods to be addressed when the entire business process lifecycle is needed. A typical process management initiative includes the following steps: (Conger 2015)

*Problem finding:* Mapping the target process helps to understand how it works. A process map is a symbolic representation of work (Damelio 2011). It shows linked the activities of all the stakeholders that intervene in the process. (Conger 2015)

*Process leaning:* Consists of identifying and removing waste. As evident as the problems may be, a formal analysis is needed to prevent hidden problems. There are several techniques to analyze the problems, one of them is Value Added Analysis (VAA). This technique consists of removing waste from the process. Some non-added value processes cannot be removed but its impact can be mitigated redesigning the process (Conger 2015). According to Conger, there are four types of event-driven processes: *Customer affecting process* are those for which a customer will pay. *Management process* are those needed to monitor and assure quality of its processes. *Primary processes* are those required to enable the process to happen. *Secondary processes* are those that are not cause to the process (Conger 2011). The steps to perform VAA are summarized in Table 11 below.

Table 11. Steps to conduct VAA.

Step	Action
1	Map the process
2	List all process activities and place them in a table categorizing the type of process. <ul style="list-style-type: none"> <li>a) Customer affecting</li> <li>b) Management process</li> <li>c) Primary process</li> <li>d) Secondary process</li> </ul>
3	Keep the customer affecting processes
4	Analyse the other to determine the real contribution to the organization

Table 11 shows that there are four steps to perform value-added analysis. These steps are: First, creating a map the process. Second, compiling the list the activities and categorize them into type of processes. Third, keeping only the customer affecting processes. Fourth, analyzing the non-customers affecting process to assess if these processes can be avoided. According to Six Sigma, leaning the process is the starting point to process reengineering.

*Process Cleaning:* The remaining activities after VAA are subject to analysis to ensure the process is efficient and effective. There are several techniques such as brainstorming, bureaucracy reduction or Root-Cause Analysis (RCA). RCA consist of asking “why” five consecutive times building each questions from the previous answer (Conger 2015). Although RCA is a common used technique, Ayad demonstrates that without critical thinking (CT) it is an insufficient tool to determine cause effects. CT consist of “a purposeful, self-regulatory reasoning which results in interpretations, analysis, evaluation and inference as well as explanation of evidential, conceptual, methodological, criteriological or contextual considerations upon which that judgment is based”. (Facione 1990: 2, cited in: Ayad 2010: 557). Ayad goes further arguing that CT protects the reasoning from prejudice, mistaken interpretation, corrupt data. Moreover, it can include the context of situations and provide a wide floor to understanding trends, implications, and risks. (Ayad 2010). When root-causes are identified, priorities need to be set. Pareto analysis is a statistical technique commonly used on this stage.

*Process Greening:* This stage focuses towards reducing the operational and carbon footprint impact of process steps. The most common techniques are outsourcing, co-production, automation, and environmental greening (Conger 2015). Outsourcing consist of shifting a function or support to another company. Co-production is teamwork to yield results. Automation considers further automation to the remaining processes. Environmental Greening considers reducing the carbon footprint of the overall process. (Conger 2015).

*Process Redesign:* at this stage, all the recommendations are compiled to formulate the ideal process considering benefits, restrictions and the like (Conger 2015). With all the analysis previously accomplished, the company is in position to take a decision supported by evidence and assessed by critical thinking.

Summarizing the concept form BPM, it can be concluded that first, a process operates in cycles, once the process is in place, outputs should be measured to assess performance. If the process is underperforming, it should be readdressed by changing the design of the process or by improving execution problems. Second, when implementing or readdressing processes should be considered the capabilities a process must have for a good performance. Additionally, companies have to bring capabilities for processes to deliver high yield. Third, there are several tools to redress processes,

one of them is the used in Six Sigma where processes are mapped, analysed, waste is removed and, the process is improved with the reduction of carbon footprint whenever possible. Finally, whichever is the technique used to analyse or redress processes, thinking logically will help assess the decision by considering a broad source of factors.

## 4.2 Knowledge Management

Presently, knowledge is recognized as an important asset and a source of competitive advantage in organizations. On the other hand, organizations have gone global, which made them realize how difficult is to gather and make useful all the information and techniques worldwide distributed. Additionally, companies have become aware of the threat that all the knowledge known only by employees can be lost (Kalpič B. and Bernus 2006). For all the reasons before mentioned, capture and distribution of that knowledge have become a strategic target for organizations. Knowledge Management (KM), is a business discipline that helps people to seize and share their knowledge, experience and expertise (Veng Seng et al. 2002).

There are several different definitions of knowledge. The Oxford English Dictionary defines knowledge as “facts, feelings, or experiences known by a person or group of people” (Kalpič and Bernus 2006: 44). Another definition is given by Davenport and Prusak (1998:5) cited in Veng Seng et al. (2002:139) describing knowledge as a “fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information”. Comparably, Baker et al. (1997) define knowledge with an equation shown in the Equation 1 below.

$$\text{Knowledge} = \text{Information} + \left[ \text{Skills} + \text{Experience} + \text{Personal capability} \right]$$

*Equation 1. Knowledge definition (Baker et al. 1997, cited in: Kalpič and Bernus 2006: 44).*

Equation 1 shows that knowledge is equals to information plus personal skills, experience and capacity. With this formula and the definitions above mentioned, it can be concluded that two persons that have the same information do not necessarily will have the same knowledge since it is directly affected by personal skills, capability,

and experience. Furthermore, Veng Seng et al. (2002) define information as “data which meaning is added by being categorized, classified, corrected and condensed” (Veng Seng et al. 2002:139). Additionally, data consists of facts or statistics, a list of tasks, ideas, charts and the like. Once data is analyzed, classified and interpreted, it becomes information. Information is translated into symbols and suitable language to become knowledge, that is to say, that information is codified in an understandable manner, and may be stored inside or outside the mind of the individual. Only the information stored outside the individual can be recovered and shared by anyone familiar with the encoding system. (Veng Seng et al. 2002).

All the different definitions of knowledge bring about a classification of knowledge to distinguish the different characteristics among the several categories. Figure 10 below shows one possible classification of knowledge categories.

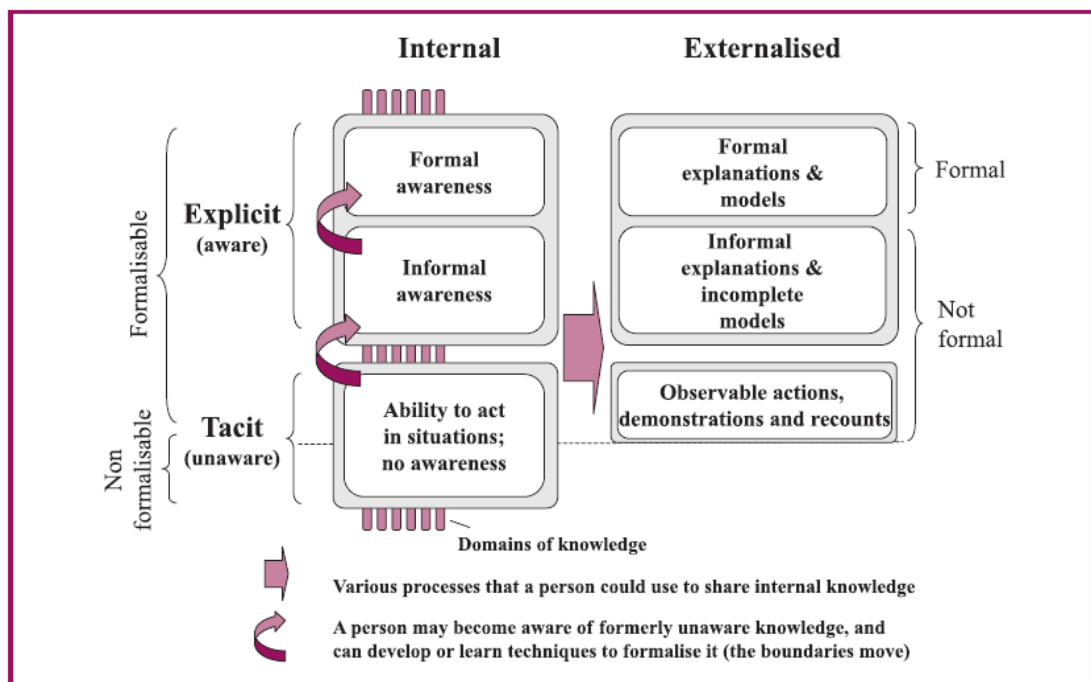


Figure 10 Knowledge categories (Kalpič and Bernus 2006: 45).

Figure 10 above distinguishes tacit from explicit knowledge. Polanyi refers to tacit knowledge as the one individuals can get from direct experience in a certain context. It is kept in an informal manner which makes hard for individuals to give a valuable verbal explanation to another. This knowledge is commonly nailed in routines and culture. Opposite to tacit knowledge is explicit knowledge, which can be expressed as word or numbers, manuals, documents, and computer files. This knowledge can

be communicated to other individuals. It is important to notice that a person may not be aware of the knowledge he or she possesses, nor be able to explain it. This distinction leads to refer tacit and explicit knowledge as unaware or aware knowledge. When the knowledge is aware brings the possibility to use it adequately according to situations, and to conceptualize it. (Kalpič and Bernus 2006).

Another important distinction in knowledge is that if it is internalized or externalized. Internalized means that knowledge is in the mind of the owner and externalized when there are records made such as written texts, models and the like. Additionally, externalized knowledge may have as well formal or informal explanations. While formal explanation refers to a consistent and complete models and forms, an informal explanation is related to incomplete models. To sum up, while explicit knowledge can always be externalized, tacit knowledge is not directly externalizable. Nevertheless, there are some mechanisms to make the formalizable part of the tacit knowledge externalizable. These mechanisms may be conversations, sharing common experiences and approaches, storytelling; alternatively, by transforming the unaware knowledge in aware. (Kalpič and Bernus 2006)

Nonaka and Takeuchi (1995) explains the process of knowledge with four processes. First, internalization is the process in which an individual internalizes explicit knowledge to create tacit knowledge. Second, in the externalization process, an individual turns their tacit knowledge into explicit knowledge using means such as documentation, verbalization, and the like. In other words, it is turning internalized, formalizable knowledge into externalized knowledge. Third, the process of combining explicit knowledge to create new explicit knowledge. Fourth, the process of socialization where tacit knowledge is transferring through observations and demonstrations. Nonaka and Takeuchi (1995) cited in Kalpič B. and Bernus P. (2006:46). Organizations should be aware of the process of knowledge flow to stimulate its knowledge activities to create value for the organization. (Kalpič and Bernus 2006).

Knowledge is useful only if it is accessible. Therefore, it should be stored in some organized system. It is important to identify what knowledge is valuable to share and keep preventing information overload. Veng Seng et al. (2002) suggest five basics steps for an effective KM. These steps are summarized in Figure 11.

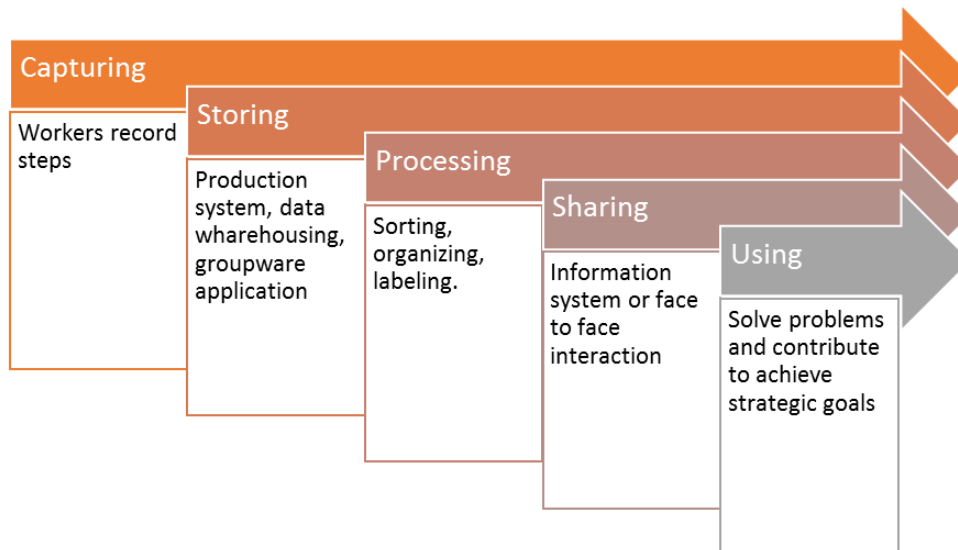


Figure 11. Five steps in managing knowledge (Veng Seng et al. 2002).

As shown in Figure 11 above, the five steps are capturing, sorting, processing, sharing and, using. The first step consists of capturing information, which means the externalization of the formalizable part of the tacit knowledge. Process mapping is one of the tools to capture the knowledge available in both, people and processes in organizations. Gareth R.T. Whit Svetlana Cicmil (2016). The second step lies in storing knowledge. It refers about how to store the captured information. There are several options to store information, going from a simple data warehousing to a production system. The third step is processing the information, which includes activities such as filtering, sorting, and comparing. Additionally, this step includes labeling the knowledge captured to facilitate others the access to it. Sharing is the fourth step. There are several tools to contribute to this step. Several of these tools are already available within the company, such as intranet, web tools, and by training programs. (Kalpič and Bernus 2006). The last step is using the knowledge. Veng Seng and other scholars argue that knowledge is the unlimited resource that grows with use. (Veng Seng et al.2002:142). Following these five steps, companies can make a better use of the knowledge already available in it. By converting the knowledge from tacit to formal and explicit, processing and labelling it in a systematic way favouring its accessibility, fostering it use and share knowledge may become a valuable asset for companies.



### 4.3 Integration-Responsiveness Framework

Managers in global markets seek to internationalize their companies consequently, their strategies. Strategies to internationalize companies can vary from industry to industry. Internationalization can be divided in *multi-domestic* and *global industry*. In multi-domestic industry, competition takes place on a local basis, like food, consumer products, and the like. On the other hand, in a global industry competition is in global or regional scale such as metals, automobiles, and so on (Cavusgil et al. 2008). Cavusgil, Knight, and Reisenberger define *Global integration strategy* the coordination of value-chain activities across countries to achieve global efficiency, cooperation, and cross-fertilization to get the maximum benefits of similarities between countries (Cavusgil et al. 2008). On the other hand, *local responsiveness strategy* alludes to provide the precise requirements of customers in each country. Whether global integration tries to achieve efficiency on a worldwide scale, local responsiveness set the practices to fit the particular requirements of each market. The trade-off between the two strategies constituted the *Integration-responsiveness Framework*. (Cavusgil et al 2008). Figure 12 below exhibits the four strategies indicating the pressures for global integration or local responsiveness.

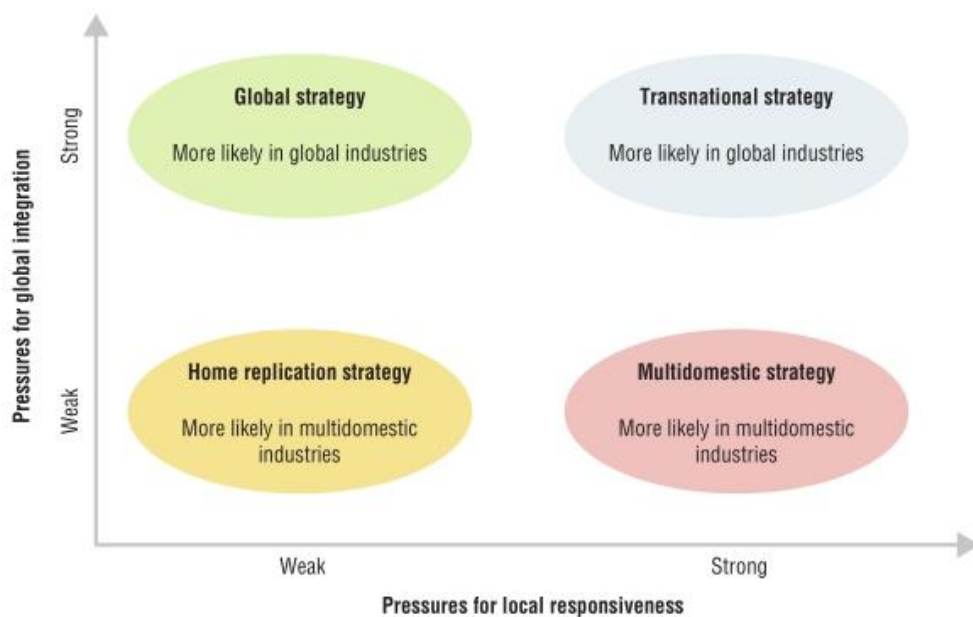


Figure 12. Strategies Emerging the Integration-Responsiveness Framework (Cavusgil, et al. 2008: 319)

Figure 12 shows that four strategies emerge from Integration-Responsiveness. First, *home replication strategy* proposes a weak internationalization process. The firm sees international business as secondary to its local business. Second, in a *multidomestic*

*strategy*, the firm gives each market a great level of autonomy. Subsidiaries may vary products and management practices. The third strategy is a *global strategy*. In this strategy, the objective is to reach the maximum efficiency, learning, and integration globally. In other words, “*the same things, the same way, everywhere*”. (Cavusgil et al. 2008: 320). The fourth option is *transnational strategy*. This strategy combines the major advantages of global and multi-domestic strategies. The firm endeavors to care local needs and at the same time, conserve enough central control of operations. The firms promote learning while ensuring efficiency. It requires uniform policies worldwide, planning and resources allocation. This strategy can be summarized in “standardize where feasible, adapt where appropriate” (Cavusgil et al. 2008: 321).

In the particular function of customer service, Christopher highlights the benefits of possessing a custom-fit service locally. While customer services activities of order fulfillment can be centrally managed, a strong local customer service management is advantageous. In this respect, he proposes key AM to ensure that all the resources of the company are hooked up to provide concrete solutions to particular local requirements. (Christopher 2011)

To summarize, companies may adapt their strategies to respond to local demands while following global policies. One of the strategies is using AM to provide a tailored service according to the customers’ requirements.

#### 4.4 Quality Information

As mentioned in section 4.2, information comprises data that has been arranged in a manner that is useful for a specific purpose. (Veng Seng et al. 2002). In organizations, information is kept in several sources such as ERP systems, databases, spreadsheets and the like.

The use of spreadsheets is present everywhere, even in large organizations. Although its use can be justified in some cases, many sustain that its use frequently brings adverse effects on data quality (Baškarada 2011, Steffen 2011). In this respect, Baškarada argues that the extraction of the information from the source system may influence in believability, objectivity, and reputation. (Baškarada 2011). Often, end users are not sure about where the information comes from or who extracted it. Additionally, the information may be incomplete or full of useless information, which not

add any value. Moreover, this idle information rarely is deleted leading to redundant storage which is another of the problems of using spreadsheets. As they can be shared among several users, each of them saves its copy. Taking to account that each user may change some information; multiple versions of the original sheet are created, leading to inconsistency. Spreadsheet applications also may affect the accuracy of information. (Baškarada 2011). Considering that self-learning users, who do not follow any software development methodology, data modeling, and scripting, do most of the models with spreadsheet accuracy; interpretability and understandability of the information are affected. These models often link several spreadsheets and may become very complex and challenging to understand, leading to a developer-dependent system. Furthermore, spreadsheets are seldom backed up risking all the information on it. (Baškarada 2011)

When it comes to downstream ERP applications, Steffen points out the shortage of attempt or capability to “capturing and storing quality information in the ERP system than other downstream applications need and use” (Steffen 2011: 1). He also adds that for most of the uses of spreadsheet models, configurations in the ERP system can be done to get the information straight from it instead of using those models. Steffen goes further saying that enhancement of ERP system to downstream applications would be beneficial. According to him, important savings and accuracy of data can be reached with a fitting integration with all IT applications. (Steffen 2011). Similarly, Yen Cheung has demonstrated that having an ERP system running in place does not signify that all the improvements have been reached. It only implies that there is a robust, accessible tool that can be used to improve performance.

Even with little investments, often in process re-engineering, important savings can be gained. (Yen Cheung 2005). Both, Steffen and Yen Cheung stress out the importance of the data quality. They suggest that even the most popular systems lose their effectiveness when the data on it is not reliable. (Yen Cheung 2005; Steffen 2011)

Summing up, the use of spreadsheet application as Excel is a common practice even in large organizations. Several studies pointed out the risks in accessibility, accuracy and comprehension that the use of spreadsheet applications may cause. Considering that most of these applications can be avoided by enhancing the ERP system it is advisable to include these applications in the ERP whenever is possible. Process

reengineering should consider the inclusion of process in the ERP system to exploit its benefits and gain in security, accessibility and comprehension of data.

#### 4.5 Conceptual Framework for This Study

The topics to develop the conceptual framework (CF) for the study were based on the key findings coming from the CSA. These topics are Business Process Management, Knowledge Management, Integration-Responsiveness framework, and, Data Quality.

The objective of this stage is to find the relevant literature addressing similar issues. The outcome consists of developing the conceptual framework to propose a common company-wide process to manage price lists. From the chosen topics, the main ideas are extracted to elaborate the CF. Table12 below shows the main ideas for each topic.

Table 12. Conceptual framework for this study.

Goal	topic	Ideas	Outcome
Find relevant literature addressing similar issues	<b>Business Process Management (BPM)</b> Hammer, M. (2007) . Harmon, P. (2015). Ayad, A (2010). Conger, S (2011).	<b>Process enablers:</b> Design, Performer, Owner, Infrastructure, Metrics Hammer, M. (2007)	Conceptual Framework to propose a common ERP-based process to manage price list
		<b>Enterprise Capabilities:</b> Leadership, Culture, Expertise, Governance. Hammer, M. (2007)	
		<b>Process Management Six Sigma:</b> Problem Finding, Process Learning, Process Cleaning, Process Greening, Process Redesign. Conger, S (2011)	
		<b>Critical Thinking:</b> Think logically Ayad, A (2010)	
	<b>Knowledge Management (KM)</b> Veng Seng et al. (2002); Kalpič B. and Bernus P. (2006).	Stimulate Knowledge activities to create value for the organization Kalpič B. and Bernus P. (2006).	
		Capturing, Storing, Processing, Sharing and Using of knowledge Veng Seng et al. (2002).	
	<b>Integration - Responsiveness</b> Cavusgil, S. et al. (2008); Christopher, M (2011)	Standardize where feasible, adapt where appropriate" Cavusgil, S. et al. (2008: 321).	
		AM for a custom-fit service Christopher, M (2011)	
	<b>Data and Information Quality</b> Baškarada, S. (2011); Steffen, D. (2011)	Get the data closest to the source. The use of spreadsheets may affect data quality Baškarada, S. (2011)	
		Get the data closest to the source Baškarada, S. (2011)	
Capturing and storing quality data Steffen, D. (2011)			

Table 12 shows that the conceptual framework merges four topics. First, Business Process Management gives notion of the cyclical nature of the processes, stressing the need to manage them on an ongoing basis. It also highlights the fundamental characteristics that a process should have as well as the support the company should provide for its good performance. Another conception gain from BPM is related to how

to approach process reengineering. Finally, critical thinking recognizes the importance of thinking logically.

Second, Knowledge Management describes the process of knowledge flow and stresses the importance for companies to acknowledge this flow to promote knowledge activities. The steps to make knowledge accessible also were explained. Based on all the features of KM and BPM and the above mentioned, it can be concluded that BPM is an ally to KM that facilitates the conversion of informal knowledge into formal knowledge and promotes the distribution and further internalization of knowledge.

Third, Integration-Responsiveness Framework presented the different strategies for internalization according to the industry. Transnational strategy was explained as one of the most adopted strategies to global industries. This strategy allows a certain degree of freedom over some functions while following global policies. It also fosters efficiency and learning. It also suggested the use of AM to assure serving customers with the right spectrum of products and services.

Finally, quality data emphasizes about getting the data closest to the source arguing that this will significantly improve the usability and functionality of downstream applications. Consequently, the use of spreadsheet risks the accuracy and security of the data. It also suggests the enhancement of ERP with downstream activities integration.

Next, in the following section the preliminary proposal is going to be developed using the main ideas from the best practices suggested in the conceptual framework along with the key topics to be addressed found in CSA and Data2.

## 5 Building a Preliminary Proposal

This section merges the results of the current state analysis and the conceptual framework with Data 2 towards the building of the proposal.

### 5.1 Overview of the Proposal Building Stage

To create the draft of the proposal, the key weaknesses of the current process identified in the CSA are discussed along with the conceptual framework to reflect on possible suggestions for improving the current process. The improvement ideas were drawn from four main areas: (a) business process management, (b) process integration, (c) data, and information management, (d) knowledge management.

Next, these ideas, along with the results from the CSA, were discussed with stakeholders to identify possible improvements suggestions. Based on their input (Data 2), the initial draft of the proposal is created and taken back to the stakeholders, in the Helsinki office and the CSC manager in the Netherlands. Each of them give their view and suggest more features for the improved process. As a part of data 2, the input of the SCM director about the constraints and requirements of the process are also included.

Table 13 below shows the logic for building the proposal (seven main challenges identified in the CSA and the findings from best practice that were identified to tackle these particular challenges). Additionally, the suggestions from stakeholders (as Data 2) are asked for and subsequently added to this vision to formulate the initial proposal presented below in Section 5.3

Table 13. Foundation for Proposal building (CSA findings + CF).

	Findings on CSA	Conceptual Framework	Ideas from best practices
Lack of a common process	1. Lack of security and accessibility in the storage of prices.	<b>Business Process Management (BPM)</b> Hammer, M. (2007) . Harmon, P. (2015). Ayad, A (2010). Conger, S (2011).	<b>Process enablers:</b> Design, Performer, Owner, Infrastructure, Metrics Hammer, M. (2007)
	2. Different Approach to address the same problems		<b>Enterprise Capabilities:</b> Leadership, Culture, Expertise, Governance. Hammer, M. (2007)
	3. Differences in prices available in ERP and the prices informed to the		<b>Process Management Six Sigma:</b> Problem Finding, Process Learning, Process Cleaning, Process Greening, Process Redesign. Conger, S (2011)
	4. Different job description within the same process	<b>Knowledge Management (KM)</b> Veng Seng et al. (2002); Kalpič B. and Bernus P. (2006).	<b>Critical Thinking:</b> Think logically Ayad, A (2010)
	<b>The Netherlands</b>		Stimulate Knowledge activities to create value for the organization Kalpič B. and Bernus P. (2006). Capturing, Storing, Processing, Sharing and Using of knowledge Veng Seng et al. (2002).
	5. The master data is the one stored in spreadsheets	<b>Integration - Responsiveness</b> Cavusgil, S. et al. (2008); Christopher, M (2011)	Standardize where feasible, adapt where appropriate" Cavusgil, S. et al. (2008: 321).
	<b>Helsinki</b>		AM for a custom-fit service. Christopher, M (2011)
6. The value quoted to the customers is known and kept by AM	<b>Data and Information Quality</b> Baškarada, S. (2011); Steffen, D. (2011)	Get the data closest to the source. The use of spreadsheets may affect data quality and accessibility Baškarada, S. (2011)	
7. There is not a common way to do the same task in the same location		Capturing and storing quality data Steffen, D. (2011)	

Table 13 above shows that there are four common problems, one problem specific to the Netherlands and two specific to Helsinki. The common problems are the lack of security and access concerning to prices, different approaches to address the same issue, differences in prices informed to the customers and prices to invoice and, differences in the job description for the same department.

Additionally, the specific problem to be addressed in the Netherlands is the master data storage. On the other hand, the main problem in Helsinki is the lack of accurate information about prices the CSC has, along with the differences when performing the same tasks. All these problems mentioned above can be overcome with some improvement to the current process.

Ideas to address these specific challenges are identified from the best practices, as shown in Figure 13 above. These ideas included features needed for a process to deliver high performance, stimulating knowledge activities, capturing the knowledge



available within the company, thinking logically, use AM to a custom-fit service, standardize when feasible and adapt where appropriate and, get the data closest to the source.

Based on this vision, improvement suggestions from the stakeholders are collected, which are discussed in more detail below.

## 5.2 Findings of Data Collection 2 (Input from Stakeholders)

From interviews with stakeholders Data 2 is collected to overcome the problems according to the findings identified as critical in CSA and fertilized with improvement ideas from best practice.

Table 14 shows the inputs gathered from the collaborative input from the stakeholders and used as Data 2 to develop the proposal.

These suggestions by the stakeholders are described in more detail below.

Table 14. Foundations for the proposal building (CSA findings + CF + ideas form Data2).

	Findings on CSA	Ideas from best practices	Data 2
Lack of a common process	1. Lack of security and accessibility in the storage of prices.	<b>Process enablers:</b> Design, Performer, Owner, Infrastructure, Metrics Hammer, M. (2007)	1. All the information about prices should be in the ERP
		<b>Enterprise Capabilities:</b> Leadership, Culture, Expertise, Governance. Hammer, M. (2007)	2. CSC should own the information about prices
	2. Different Approach to address the same problems	<b>Process Management Six Sigma:</b> Problem Finding, Process Learning, Process Cleaning, Process Greening, Process Redesign. Conger, S (2011)	3. We do not need the input form AM to update the values into the ERP.
	3. Differences in prices available in ERP and the prices informed to the	<b>Critical Thinking:</b> Think logically Ayad, A (2010)	4. The information of prices to the customer should be extracted from ERP
	4. Different job description within the same process	Stimulate Knowledge activities to create value for the organization Kalpič B. and Bernus P. (2006).	5. AM knows better the customers. They should be who inform them about changes in prices
		Capturing, Storing, Processing, Sharing and Using of knowledge Veng Seng et al. (2002).	6. The process should involve the cooperation with AM
	<b>The Netherlands</b>		
	5. The master data is the one stored in spreadsheets	Standardize where feasible, adapt where appropriate" Cavusgil, S. et al. (2008: 321).	7. If the use of spreadsheets can be avoided, it would be an improvement
		AM for a custom-fit service. Christopher, M (2011)	8. The process should avoid the use of spreadsheet as much as possible
	<b>Helsinki</b>		
6. The value quoted to the customers is known and kept by AM	Get the data closest to the source. The use of spreadsheets may affect data quality and accessibility Baškarada, S. (2011)	9. Prices should be kept in the ERP and from there AM should inform customers	
7. There is not a common way to do the same task in the same location	Capturing and storing quality data Steffen, D. (2011)	10. A methodical way to work from AM is needed to get the information in CSC	
<b>Proposal to develop a ERP-based process to manage price lists</b>			

Table 14 above shows that the third block of the proposal contains suggestions from the stakeholders. First, SCM expresses his willingness to avoid any extra use of spreadsheet and manual work. SCM states that:

*“I want to get AM involved in the prices; if they can control the prices recorded into the system would be perfect, we need to lighten the workload of CSC as much as possible.”*

- SCM Helsinki

With this statement, SCM suggests that AM may act as controller of the information in prices available in the ERP.

Second, CSC representatives in Helsinki suggest that the CSC should own the price process, and that the information kept in the ERP system should be the one valid over the spreadsheet. Customers should get the prices according to what is to be invoiced,

and that is what is uploaded in the ERP system. If any difference is spotted in prices, this should be modified in the system before sending the prices to the customers. Another comment from a CSC representative was:

*“AM should send the prices to the customers. Each customer has its desires and AM knows better.”*

- CSC representative Helsinki

This statements suggests that AM should be responsible of informing prices to customers. Also, analysing the possibility to implement a process similar to the Netherlands one of the CSC representatives says that:

*“I would rather not have the responsibility over informing prices to the customers.”*

- CSC representative Helsinki

Similarly, this statement also suggests that the responsibility of informing prices should not be in CSC.

Third, the NL unit is satisfied with the process they have nowadays. The unit does not see any advantage or need in make AM to send prices to the customers. Currently, the unit prefers do it in this way since they can keep control over the prices agreed with customers. However, the unit sees the opportunity for improvement in the way prices are informed to CSC by AM external from Netherland. CSC manager says that:

*“In other locations, they are using their own templates which makes it difficult for us to see what the current MTZ value and base price is.... In some cases, prices change without letting us know, with the consequence that SAP prices are not updated”.*

- CSC manager NL

The above statement suggests that is desirable to harmonize the process within locations, and that information is essential to it.

Table 15 below summarizes the stakeholder suggestions (Data 2) to address the key issues identified in CSA.

Table 15. Suggestions from Data 2 addressing key findings from CSA.

	Issue	Data 2
<b>Common</b>		
1	Lack of security and accessibility in the storage of prices	a) All the information about prices should be in the ERP
2	Different Approach to address the same problems	b) When customers complain about prices and they are right, corrections should be done.
3	Differences in prices available in ERP and prices informed to the customers	c) prices should be sent coming from the SAP and checked before sending to prevent errors.
4	Different job description in the same process in different location	d) AM knows better the customers. They should be who keep inform the customers about prices
		e) More involvement with AM in prices process
<b>Netherland</b>		
5	Master data is stored in spreadsheet	f) The master data is the one stored in the ERP
		g) If the ERP is reliable, spreadsheet are not needed
<b>Helsinki</b>		
6	The value quoted to the customers is known and kept by AM	h). Prices should be kept in the ERP and from there AM should informed customers
7	Not a common way to do the same task in the same location	
<b>General features</b>		
8	Features for the improved process	i) The process should avoid using of spreadsheet as much as possible
		j) A methodical way to work with AM is needed to get the information in CSC
		k) All the information related to it should be available in CSC
		l) Input from AM is not needed to update special surcharges in ERP (CSC NI)

Table 15 shows the ideas of the improved process. While some ideas refer to some issues directly, there are also general ideas, which were used to shape the proposal of the common process.

### 5.3 Proposal Draft

This proposal suggests to introduce one process for both units, Helsinki, and the Netherlands. The proposed process is the *Price list management process* and has two sub-processes. One is the sub-process in which the information is recorded and maintained, called the *Recording and maintaining price list process*. The other is the sub-process to inform prices to customer, the *Informing prices process*.

To develop the proposal, key CSA findings and stakeholder suggestions were taken into consideration. First, about the security of the information about prices in the company, several stakeholders suggested to utilize the ERP to maintain the master data which is also suggested by the best practices from the literature reviews. Moreover, SCM proposed to avoid the use of spreadsheets whenever possible.

Second, the special conditions in the CSC were taken in consideration. In Helsinki, stakeholders stressed out about the need of cooperation with AM and the general will of keeping AM at informing prices. On the other hand, the NL unit is satisfied with the way the unit is working where CSC informs about price changes to the customers. This process helps the unit to have control over prices. Eventually, these problems point to a wide challenge of how to unify the process if the job description is different. In this respect, best practice suggests that a process cannot always be unified to the full leaving the possibility to adapt the process in certain aspects to the local necessities. Nevertheless, some recommendations will be done in this respect further on in Section 6.

Third, the proposal contains some practices used in the NL units and other used in the Helsinki unit that have been identified as “best practices” to be applied in the common proposed process. On one hand, the NL unit updates the information quarterly without the input of AM. The information about new values of surcharges is prepared and informed by CSC in Helsinki and the NL. Next, the new values are updated automatically into the ERP by CSC in both locations. Once the information is updated in the ERP, it can be used to inform the new values to the customers. On the other hand, at the Helsinki unit, some stakeholders are informing prices to the customers with the information extracted from the ERP instead of the information coming from the Excel file. If some errors are spotted, changes are requested to CSC representative and, once the corrections are done, a new list is extracted from the ERP to inform the customers.

Fourth, the proposed process contains more steps than the original processes (see Figure 2 and Figure 5) since it includes a checking loop to assess the accuracy of prices in the ERP before sending them to the customers. This is intended for two reasons. First, to verify the truthfulness of information recorded in the ERP, which is the information accessible and available by the company. Second, to improve the invoicing process (IP). Considering that invoices are taking the values from the ERP

and prices are informed using the same source (ERP), both values (the invoiced and the informed) should be the same.

The proposed process is presented for the two units. However, due to the different job descriptions used in each location, one of the sub-processes in Helsinki is performed by AM and in Netherland by CSC. Figure 13 shows the proposed *Price list management process*.

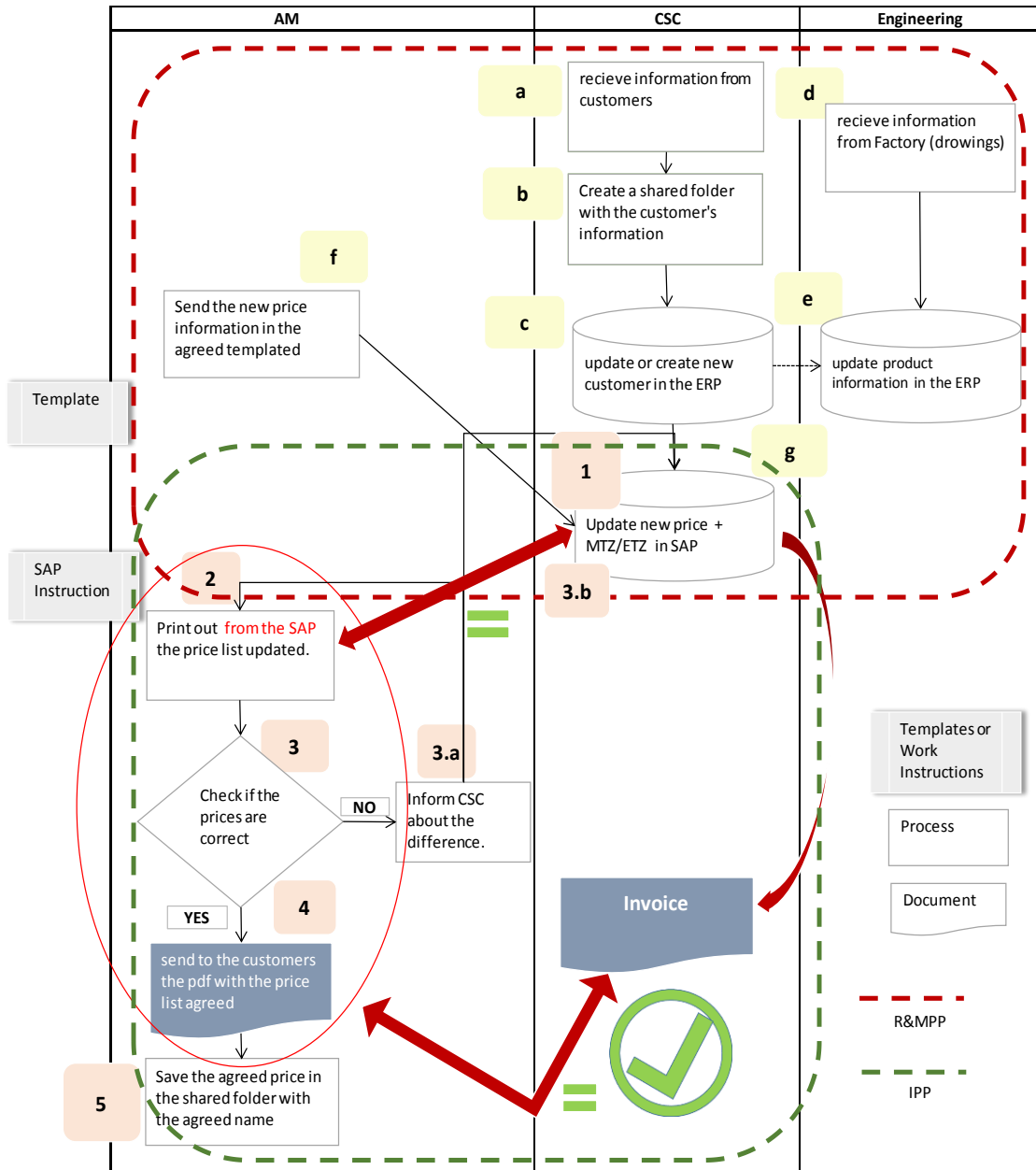


Figure 13. Preliminary Proposal Price list management process.

Figure 13 shows that the process contains two sub-processes: the *recording and maintaining price process* (R&MPP) and the *informing price process* (IPP). The R&MPP is marked with a red-dashed line and the steps with letters. The IPP is marked with a green-dashed line, and the steps are represented with numbers. The processes are conducted as explained in Table 16 below.

Table 16. Steps for the Price list management proposal (initial).

step	Content	Stakeholder	Sub-process	Instructions
a	Receiving information from customers	CSC	R&MPP	
b	Creating a shared folder with digital information about the customer	CSC	R&MPP	
c	Creating the customer in ERP	CSC	R&MPP	
d	Receiving information from the plant	Engineering	R&MPP	
e	Updating the product information in the ERP and creating the product part number	Engineering	R&MPP	
f	Sending the excel file with customer information	AM	R&MPP	Template
g	recording the prices and conditions in ERP	CSC	R&MPP	
1	Updating special surcharges in ERP	CSC	R&MPP	
2	Printing the Price list from ERP	AM / CSC NL	IPP	Instruction
3	Checking if prices are correct against previous month file	AM / CSC NL	IPP	
3.a	If prices are wrong, require CSC to correct them	AM / CSC NL	IPP	
3.b	Correct wrong prices	CSC	R&MPP	
4	If prices are correct, send them in pdf to the customer	AM / CSC NL	IPP	
5	store the price file en the customer file labeled according to instructions	AM / CSC NL	IPP	Instruction

R&MPP: Recording & Maintaining Price Process

IPP: Informing Price Process

Table 16 shows that there are two sub-processes proposed. First, in the R&MPP the stakeholders are: a) CSC, b) Engineering and, c) Sales (AM).

In the first sub-process, in *Step a*, CSC receives information from the customers. In *Step b*, CSC create a shared file to store the digital information available from the

customer. In *Step c*, CSC creates the customer in ERP. In *Step d*, engineering receives information from the plant. In *Step e*, engineering updates the information from the product in the ERP creating the product part number linked to the customer. In *Step f*, AM informs CSC about the prices and conditions (using the proposed template in 5.4). In *Step g*, CSC record the prices and conditions for the customer and the product. All these steps are from the R&MPP along with the first step in the following process.

In the second sub-process, the IPP has different stakeholders at the locations, and this is the only difference in the proposed process. In Helsinki, the stakeholders are AM and CSC. On the other hand, in the NL the stakeholders for this sub-process are CSC (CSC NL) and CSC manager NL. The process starts with the updating of indexes that will update value for special surcharges (MTZ/ETZ) by CSC in *Step 1*. In *Step 2*, AM (CSC NL) prints out the prices from the ERP. Instructions are written to this step (see Appendix 6). In *Step 3*, AM (CSC NL) checks the values against the previous month prices if the incremental is correct. If errors are detected, AM (CSC NL) should request corrections from CSC (CSC manager in NL) in *Step 3.a*. In *Step 3.b*, CSC correct the values in the ERP. Then AM (CSC NL) should start again from *Step 2*. If in *Step 3* no error is noticed, *Step 4* follows where the file is sent to the customers in pdf format. In *Step 5*, AM (CSC NL) stores the price sent to the customer in the shared files according to instructions.

Summing up, the proposed process is suggested for both units. It consists of two sub-processes which steps are the same for both locations. However, due to the different job descriptions used in each location, the stakeholders for one of the sub-processes are currently different. Whereas in the IPP process in Helsinki prices are informed by AM and in the Netherlands are informed by CSC.

#### 5.4 Proposal for the Template to Inform Prices

To support the proposed process, a template to inform changes in prices is also proposed. In the CSA, it is identified that the different layout and the lack of information in the templates utilized to inform changes in prices makes the tasks of updating prices confusing. Also in the NL, some observations are done about the lack or difficulty to understand some templates. Consequently, a common template is proposed to be filled by AM to inform CSC about changes in prices. To design the template,



input from CSC and AM is used, resulting in a template with the information needed for CSC to identify products and values to update. The proposed template is depicted in Figure 14 below.



Figure 14 above shows that the template requires first, the name of the customer and the period when the prices are valid. Second, information about indexes applied for the customer and the periodicity of actualization. Third, key information such as the product part number, sales organization and, end customer. Fourth, more information about quantity, weight and different prices. The template also specifies that no extra information should be added into the template to prevent confusion. However, there is a free field to add some comments if AM consider necessary. The purpose of this template is standardize the way changes in prices are informed facilitating the understanding by CSC representatives of the information received and assuring that all the information needed to identify products and prices is provided.

## 6 Validation

This section discusses the results of the validation and feedback stage of the study. It also contains some recommendations concerning the overall results of the study in terms of the implementation of the proposal into practice.

### 6.1 Overview of the Validation Stage

In this stage, the initial proposal is presented to the key stakeholders and suggestions how to improve the current practices are discussed. The goal is to discuss the steps for harmonizing the price list process between the two units.

First, the proposal was taken to the SCMD in Helsinki and discussions about how the process should work have been done. Second, the proposal is presented to the stakeholders in Helsinki. Third, the proposal is presented to the stakeholders along with the SCMD from Netherland by e-mail stressing the key points to be improved and the reason supporting the suggestions.

### 6.2 Feedback for the Initial Proposal (Data 3 Collection)

The validation and feedback sessions are conducted in both units. In Helsinki with the SCMD and stakeholders (two of three stakeholders). In Netherlands (NL), with the CSC manager and the SCMD for NL.

In Helsinki, the feedback from CSC representatives and SCMD is positive.

*"I am pleased with the proposal, the arguments are clear and so is the solution; I have already presented some features to the sales director."*  
- SCMD Helsinki

SCMD finds in the process all what was expected for it, including all the arguments needed to present the proposal to other department involved. However, some CSC representatives are skeptical about the degree of commitment of some AM in perform the tasks assigned to them.

In the Netherlands, the feedback is positive too, but with some doubts about how to check whether the information in the ERP does not contain errors.

*“If we can use it, I think it would be an improvement as we do not have to use the excel anymore. On the other hand, the Excel will trigger SAP failures ... For the accountants, we do need to do a double check which cannot be done anymore if we only use SAP”.*

- CSC manager NL

As it is seen in the feedback given by stakeholders in the NL, there are several doubts about the reliability of the ERP. However, the feedback of the SCMD is positive.

*“I must say it’s a very good summary...., it certainly appears that your endeavors are going to be paying off (if not straight away, but certainly within the coming weeks).”*

- SCMD NL

The SCMD from the NL is pleased with the proposal and has plans to take the proposal to a further stage.

The proposed process is divided in two sub processes, the R&MPP is currently being used in the NL unit and the IPP is used in the Helsinki unit by one of the stakeholders with favorable outcomes. Table 17 below, summarizes the validation sources of the proposal as feedback and partial testing of the process.

Table 17. Validation summary.

<b>Feedback + Partial testing</b>
<b>Helsinki</b>
Positive feedback of all the Stakeholders
Partial Testing of the <i>IPP</i> with positive outcome
Positive feedback of Manager
<b>Netherland</b>
Partial testing of the <i>R&amp;MPP</i> with positive outcome
Positive feedback although with some doubts from the team Leader
Positive feedback from the Manager

Table 17 above shows that the feedback is positive in the Helsinki unit and at the NL unit, but with some skepticism from the stakeholders about the possibility of using the

ERP without the support of Excel files to double check of the information automatically updated.

### 6.3 Final proposal

The final proposal is a common process named *Price List Management Process (PLMP)* that includes two sub-processes, the *Record and Maintaining Price Process (R&MPP)* and the *Informing Prices Process (IPP)*. The R&MPP is a simplification of how the NL unit is currently working. The IPP is being used with some AM and CSC representatives in Helsinki unit.

The process is proposed to be divided into two sub-processes as shown in Figure 15 below.

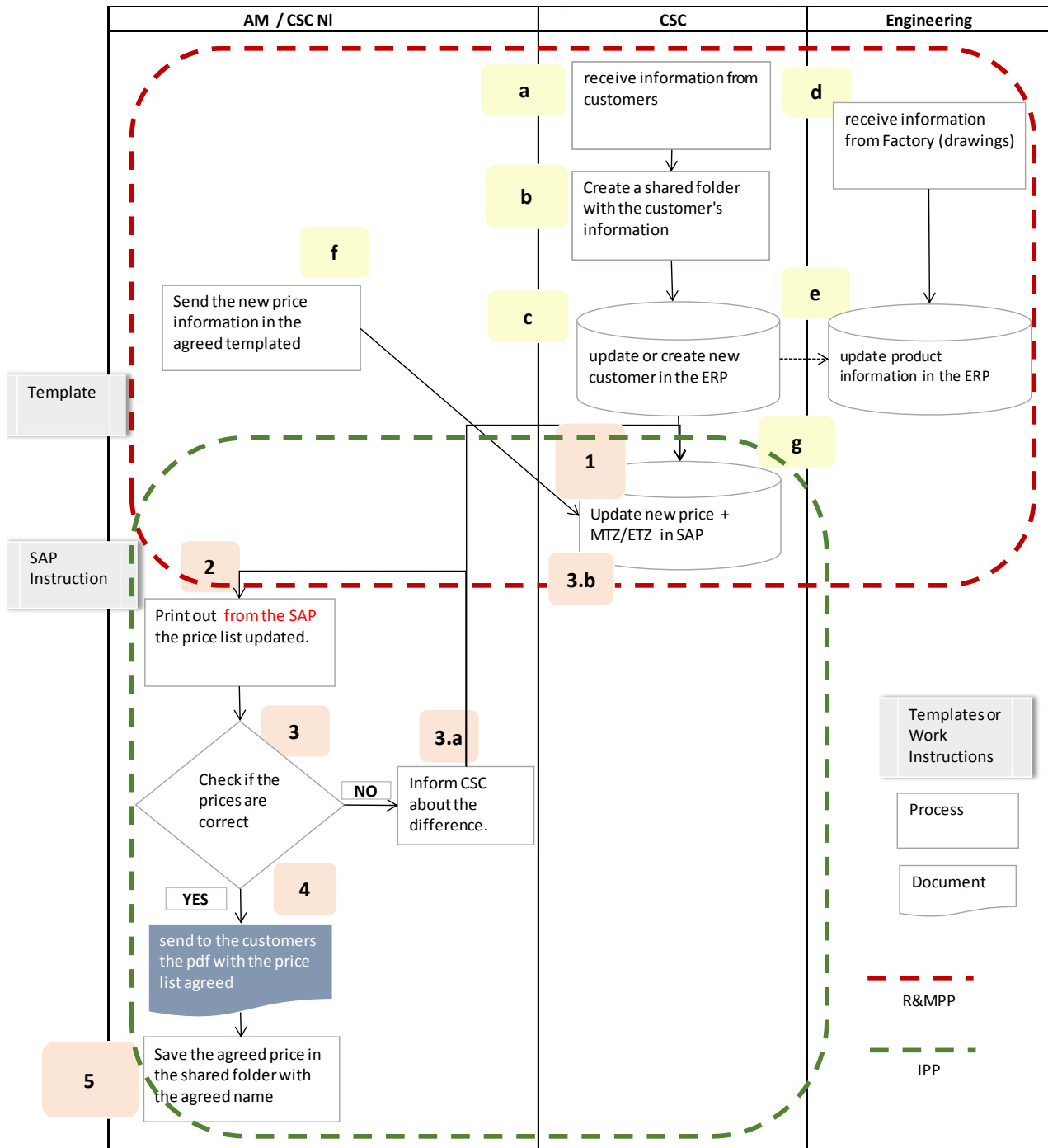


Figure 15 Final proposal for Price List Management Process

Figure 15 shows the final proposal of the *Price List Management Process*. In this final proposal, three departments intervene in the process, AM (sales), CSC, and Engineering. The two sub-processes integrating the final process are first, the *record and maintaining price process*. Second, the *information price process*.

Table 18. Steps for the Price list management process.

step	Content	Stakeholder	Sub-process	Instructions
a	Receiving information from customers	CSC	R&MPP	
b	Creating a shared folder with digital information about the customer	CSC	R&MPP	
c	Creating the customer in ERP	CSC	R&MPP	
d	Receiving information from the plant	Engineering	R&MPP	
e	Updating the product information in the ERP and creating the product part number	Engineering	R&MPP	
f	Sending the excel file with customer information	AM	R&MPP	Template
g	recording the prices and conditions in ERP	CSC	R&MPP	
1	Updating special surcharges in ERP	CSC	R&MPP	
2	Printing the Price list from ERP	AM / CSC NL	IPP	Instruction
3	Checking if prices are correct against previous month file	AM / CSC NL	IPP	
3.a	If prices are wrong, require CSC to correct them	AM / CSC NL	IPP	
3.b	Correct wrong prices	CSC	R&MPP	
4	If prices are correct, send them in pdf to the customer	AM / CSC NL	IPP	
5	store the price file on the customer file labeled according to instructions	AM / CSC NL	IPP	Instruction

R&MPP: Recording & Maintaining Price Process

IPP: Informing Price Process

Table 18 above shows that at the first sub-process there are two sub-processes. First, in the R&MPP the stakeholders are: a) CSC, b) Engineering and, c) Sales (AM). In *Step a*, CSC receives information from the customers. In *Step b*, CSC create a shared file to store the digital information available from the customer. In *Step c*, CSC creates the customer in ERP. In *Step d*, engineering receives information from the plant. In *Step e*, engineering update the information from the product in the ERP creating the product part number linked to the customer. In *Step f*, AM informs CSC about the prices and conditions. There is a template to send this information. In *Step g*, CSC records the prices and conditions for the customer and the product. All these steps are from the R&MPP along with the first step in the following process.



Second, the IPP has different stakeholders in the locations, and this is the only difference in the proposed process. In Helsinki, the stakeholders are AM and CSC. On the other hand, in the Netherlands, the stakeholders for this sub-process are CSC (CSC NL) and CSC manager in the NL. The process starts with the updating of indexes that will update value for special surcharges (MTZ/ETZ) by CSC in *Step 1*. In *Step 2*, AM (CSC NL) prints out the prices from the ERP. Instructions are written to this step (see Appendix 6). In *Step 3*, AM (CSC NL) checks the values against the previous month prices if the incremental is correct. If errors are detected AM (CSC NL) should request corrections from CSC (CSC manager in NL) in *Step 3.a*. In *Step 3.b*, CSC corrects the values in the ERP. Then AM (CSC NL) should start again from *Step 2*. If in *Step 3*, no error is noticed, *Step 4* is followed where the file is sent to the customers in pdf format. In *Step 5*, AM (CSC NL) stores the price sent to the customer in the shared files according to instructions.

Summing up, the proposed process is created for both units. It consists of two sub-processes which steps are the same for both locations. However, due to the different job descriptions used in each location, the stakeholders for one of the sub-processes are different. Whereas in the IPP process in Helsinki prices are informed by AM and in the NL are informed by CSC. Additionally, the proposed process contains more steps than the previous processes intending to reach two benefits. First, enhancing the reliability of the data stored in the company's database (ERP). Second, improving the accuracy in input to the invoicing process (IP) which is fed by the PLMP. Considering that the Price list management process proposed (PLMP) is performed monthly, quarterly or annually, and the Invoicing process (IP) is performed daily, the proposal aims to perform a more thorough process monthly to benefit a downstream process (IP) which is performed daily.

#### 6.4 Recommendations

First, implementing the process should come along with an exhaustive cleaning of the information available into the ERP system. Otherwise, checking before invoicing is necessary until all the prices are revised. This cleaning should be done in cooperation with AM and CSC.

Second, a comprehensive training about the whole process and its implications with the quality of information stored in the ERP and the downstream processes is recommended. Through the study, high expertise in some stakeholders have been identified. It is suggested to promote this expertise by utilizing these stakeholders as trainers of the new process to reinforce the knowledge and the sense of ownership.

Third, the proposed process allows that at the NL unit prices are informed to the customers by CSC. However, further analysis is recommended to do in this respect whether integrating AM to this process will be beneficial for the company. As it is suggested by best practices literature, AM may help to provide a custom-fit service locally. Additionally, AM should manage the accounts of customers in a broader sense, which includes the management of prices.

Finally, this study explores the benefits of knowledge management to create value in organizations. It is recommended to the case company to make use of the extensive knowledge available in the organization by capturing, making it accessible and communicating it through the means already available in the case company such as intranet. The intranet also has the benefit of being present in every location allowing participants everywhere to comment and suggest.

## 7 Discussion and Conclusions

This section discusses the summary of the study along with the evaluation of the outcome against the objective of the study and the validity and reliability of the study results.

### 7.1 Summary

This study focuses on the proposal of a new ERP-based process to manage price lists within the case company. Currently, the case company is facing issues regarding this subject due to the manner the price lists are being used and kept. Two departments use the price lists within several locations. These units are physically distant and located one in Finland and the other in the Netherlands. Additionally, to the physical distance, not all users in this process keep prices in the company database leading to risks and inaccessibility to information. The study focuses on finding a solution to this problem and, to reach this objective, it is divided into five stages.

First, the objective is established along with the scope of the study. Two locations have been chosen to be analyzed and to propose a process that can work together. From this process, further implementation can be done to the rest of the locations. Second, the Current State Analysis established an understanding of how the two units are currently working with the price lists. At this stage, interviews with stakeholders were conducted as well as observation on the process and analysis of the documentation available in the case company. Observations were mostly done in the invoicing process which is a sub-process fed by the main process of this study and where most of the problems arise. The outcome in this stage is the strengths and weaknesses of the current process of managing price lists and key issues to improve.

Third, best practice and available knowledge addressing the issues found in the current state are explored identifying the main ideas that can help to overcome the process weaknesses. These ideas are merged into the conceptual framework of the study and used to reinforce the proposal. Fourth, the preliminary proposal is developed using the key findings from the current state, findings from available knowledge and improvement suggestions from the stakeholders in this process. These suggestions come from the interviews with stakeholders and managers about the features for the improved process. The preliminary proposal consists of a process that can be utilized in both units

and combines the most effective or necessary features from the current process in both locations, Finland and the Netherland. Additionally, the proposed process is aligned to the process currently specified by the sales department. Finally, the preliminary proposal is evaluated with the stakeholder and managers.

Next, a new common process is presented agreed and evaluated by stakeholders. The process stresses about the using of the ERP the company already possesses with the features available. Considering that one part of the process is currently working with good outcomes in the Helsinki unit and another part of the process is used in the Netherlands, the proposal is formulated in such a way that both parts can be implemented separately. Moreover, it points to a step-by-step logic which can help to implement the full amount of improvements in the next step, and thus not to disturb the ongoing process too much.

If the proposed process is implemented, several benefits can be reached. First, data will be kept in the company database, providing security and accessibility of data. Consequently, prices are going to be known by CSC or by the department that need that information. Finally, downstream processes such as Invoicing process are going to be benefited since there will be no need to check prices before invoicing leading to savings in working hours and errors reductions.

## 7.2 Practical/ Managerial Implications

For the proposed process to be implemented, some managerial considerations need to be taken into account. First, all the stakeholders need to be trained about the process and the implications related with the lack of compliance of it. Second, the information available in the company database (ERP) should be carefully cleared up and each stakeholder have to custody the quality of all data recorded into the ERP. Third, the proposed process, if implemented, needs to be controlled and redressed if the outcomes are not satisfactory. Fourth, communication among different departments and locations is recommended to foster collaboration and further resolution to issues such as the business challenge of the current study.

### 7.3 Evaluation of the Thesis

This section evaluates the result of the study by comparing it with the objective set at the beginning of the study. In this section also the validity and reliability is evaluated.

#### 7.3.1 Outcome vs Objective

The objective of the study is to propose an ERP-based process to manage the price list in two locations. Additionally, the business challenge of the study was the lack of common methods to manage price lists in different locations and departments, and in some extreme cases even in the same location.

The outcome of the study is a new process that combines good practices from both locations. The new process also is aligned with the process defined by the sales department, which is one of the key stakeholders of the process. The proposed process also includes a template (in Section 5.4) to clarify the information exchange and an instruction about how to operate the ERP (see Appendix 6).

The proposed common ERP-based process to manage price lists for the two locations serves as a starting point for further implementation in the selected location and in the rest of the organization is considered beneficial. If implemented and tested with positive results, this process or its logic may be use for further harmonization in other locations where the case company operates.

#### 7.3.2 Reliability and Validity

In section 2.4 the validity and reliability plan for this study was established. After the study was completed, this section revises how validity and reliability were insured in this study.

For ensuring validity of the results of the study, feedback and partial testing of the proposed process were conducted, along with the use of several sources of information such as observation, different stakeholders and documentation analysis. Additionally, available knowledge and best practice coming from reliable source of information helped to strength the validity of the proposal. The validity of the study was further reinforced by following the case study protocol. The appendixes of the study show the documentation

analyzed along with the e-mails used to follow up the understanding and evaluation of the process.

The reliability of the study was ensured by involving the relevant stakeholders and gathering suggestions and feedback from 100% of stakeholders in CSC in Helsinki unit and by the key stakeholders in the Netherlands. SCMD from both units also gave feedback of the proposed process. Finally, the reliability was also strengthened by the fact that the researcher is not part of the case company which reduces a possible bias in conducting the study. Thus, it can be cautiously generalized that, if the same research design was utilized, using similar data sources and in the same environment, but was conducted by another researcher, the same outcomes could likely be achieved in the same circumstances.

#### 7.4 Closing Words

As it has been defined at the beginning of the study, the case company is a major provider of casted products. The casting process uses a mold which shapes the desired form, where liquid metal is poured and left to cool and harden to obtain the required structure. The quality of the mold is critical to shape and obtain a good product. Likewise, activities that need coordination and cooperation among different departments and stakeholders need a mold to harmonize the chain of activities that will be delivered the desired outcome. The mold for these interlinked activities is a formal and agreed process, supported and used by all stakeholders, which will bring about a significant impact in the quality and reliability of the provided services.

## References

- Ayad, A (2010). Critical Thinking and Business Process improvement. *Journal of Management Development* Volume 29 Iss 6pp 556-564
- Baškarada, S. (2011). How spreadsheet applications affect information Quality". *The Journal of Computer Information System*. 51, 3 77-83
- Baxter, P. and Jack, S. (2008). Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. *The Qualitative Report*. Volume 13 (4) December 2008, Available from URL <http://www.nova.edu/ssss/QR/QR13-4/baxter.pdf> (accessed May 03, 2016).
- Cavusgil, S. Knight, G. Reisenberger, J. (2008) *International Business. Strategy, Management and the New Realities*. New Jersey Pearson Prentice Hall
- Christopher, M (2011) *Logistics and Supply Chain Management* 4<sup>th</sup> Edition. China Financial Time Series. FT press
- Conger, S. (2015). Six Sigma and Business Process management". *In: Handbook on Business Process Management 1: Introduction, Methods, and Information Systems (International Handbooks on Information Systems)*. (2015), J. von Brocke and M. Rosemann, Eds. 2nd ed. Berlin Springer, 127-146
- Conger, S (2011). *Process Mapping and Management*. 1<sup>st</sup> Edition New York. Business Expert Press Information Systems collection.
- Gareth R.T. Whit Svetlana Cicmil (2016). Knowledge acquisition through process mapping, *International Journal of Productivity and Performance Management*. Vol 65 (3), 302-323.
- Damelio, R. (2011). *The Basics of Process Mapping*. 2nd Edition. New York. Productivity Press.
- Jeston, J. and Nelis J. (2006). *Business Process Management: Practical Guidelines to Successful Implementation*. 1<sup>st</sup> Edition. Great Britain, Elsevier.
- Kalpič B. and Bernus P. (2006). Business Process Modelling Through the Knowledge Management Perspective. *Journal of Knowledge Management*, Vol. 10 (3), 40-56.
- Hammer, M. (2007). The process Audit. *Harvard Business Review*. April 2007, 111-123.

- Hammer, M. (2015). What is Business Process Management *In: Handbook on Business Process Management 1: Introduction, Methods, and Information Systems (International Handbooks on Information Systems)*. Von Brocke, J. and Rosemann, M, Eds. (2015). 2nd ed. Berlin Springer, Vol. 3, 16
- Harmon, P. (2015). The Scope and Evolution of Business Process Management. *In: Handbook on Business Process Management 1: Introduction, Methods, and Information Systems (International Handbooks on Information Systems)*. (2015), J. von Brocke and M.Rosemann, Eds. 2nd ed. Berlin Springer, 37-80
- Panagacos, T. (2012). *The Ultimate Guide to Business Process Management: Everything you need to know and how to apply it to your organization*. Great Britain. Amazon.co.uk, Ltd. Marston Gate.
- Riege, A (2003). Validity and reliability tests in case study research: a literature review with “hands-on” applications for each research phase. *Qualitative Market Research: An International Journal*. Vol. 6 (2), 75 – 86.
- Steffen, D. (2011). Getting Data Right at the Source: Benefits of tighter source and downstream application integration. *Insurance Networking News*. Vol.14 (6), 36.
- Veng Seng, Ch., Zannes, E. and Wayne Pace, R. (2002). The contributions of knowledge management to workplace learning, *Journal of workplace Learning*, Vol. 14 (4),138 - 147.
- Yen Cheung I. (2005). Business process re-engineering pays after enterprise resource planning. *Business Process Management Journal*, Vol. 11 (2), 185-197.
- Yin, R.K. (2009). *Case Study Research – Design and Methods*. 3rd ed. Thousand Oaks, CA: Sage Publications.



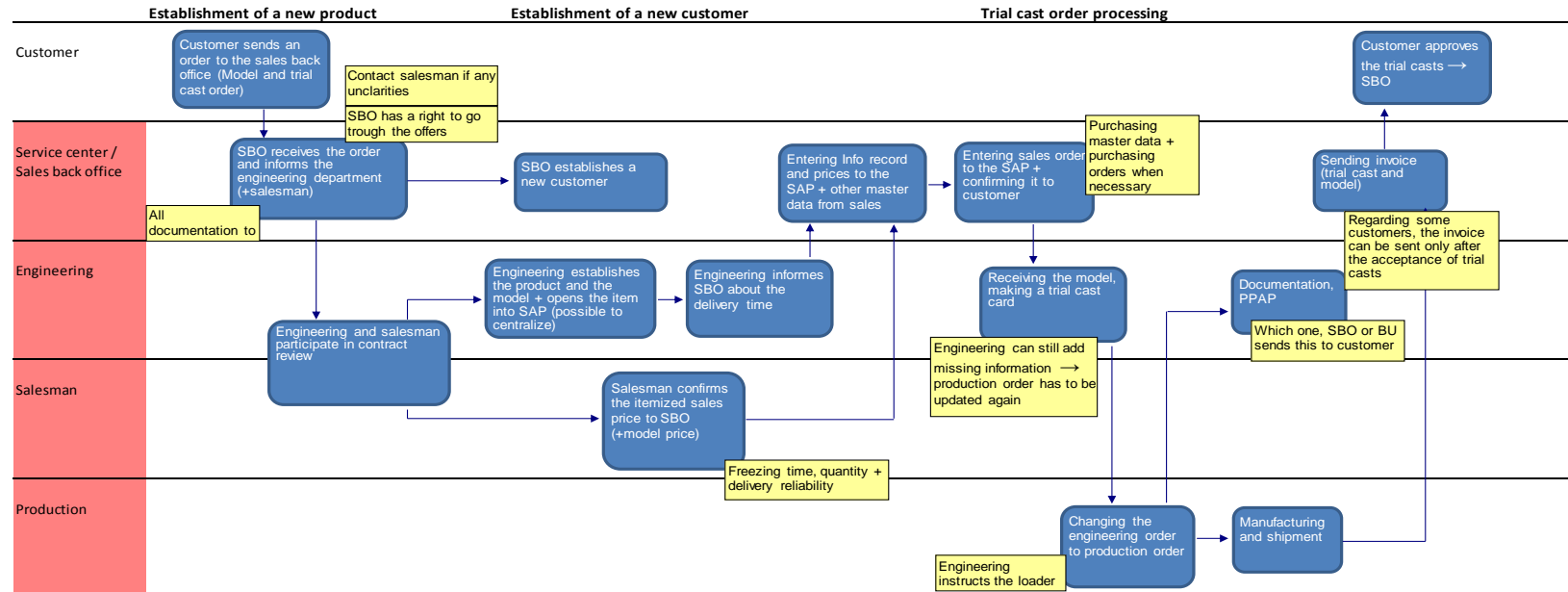
## Appendix 1. Sales Process Helsinki (Data 1).

TO BE process

Process day 14/02/2011

Sales

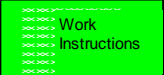
Service: **Maintaining master data: Maintaining and updating basic sales data**



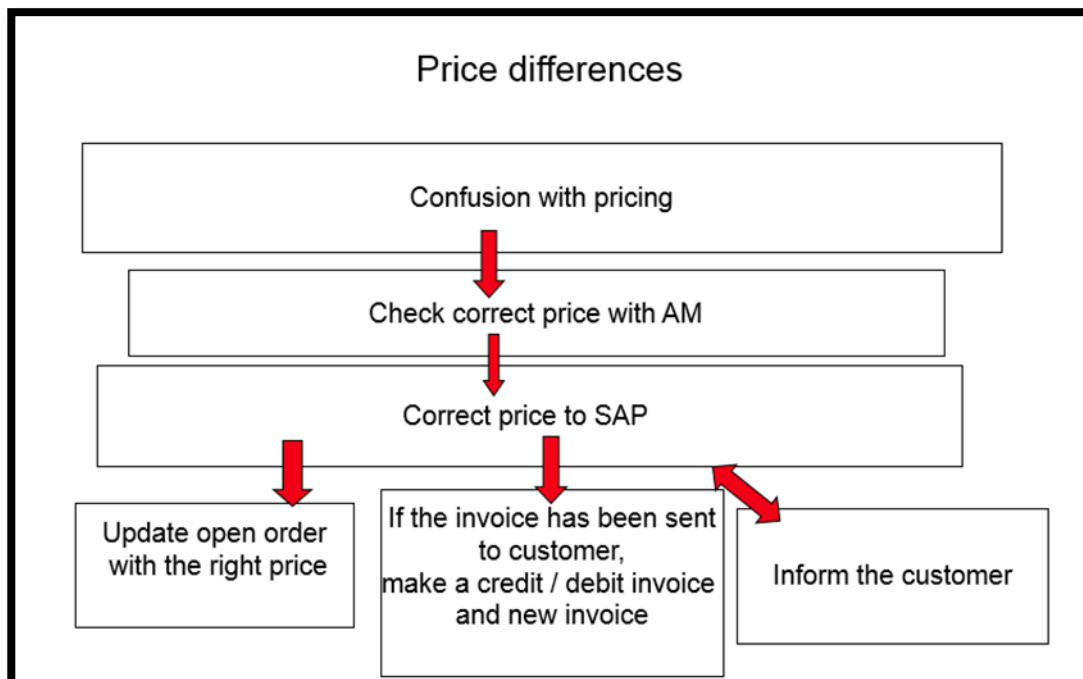
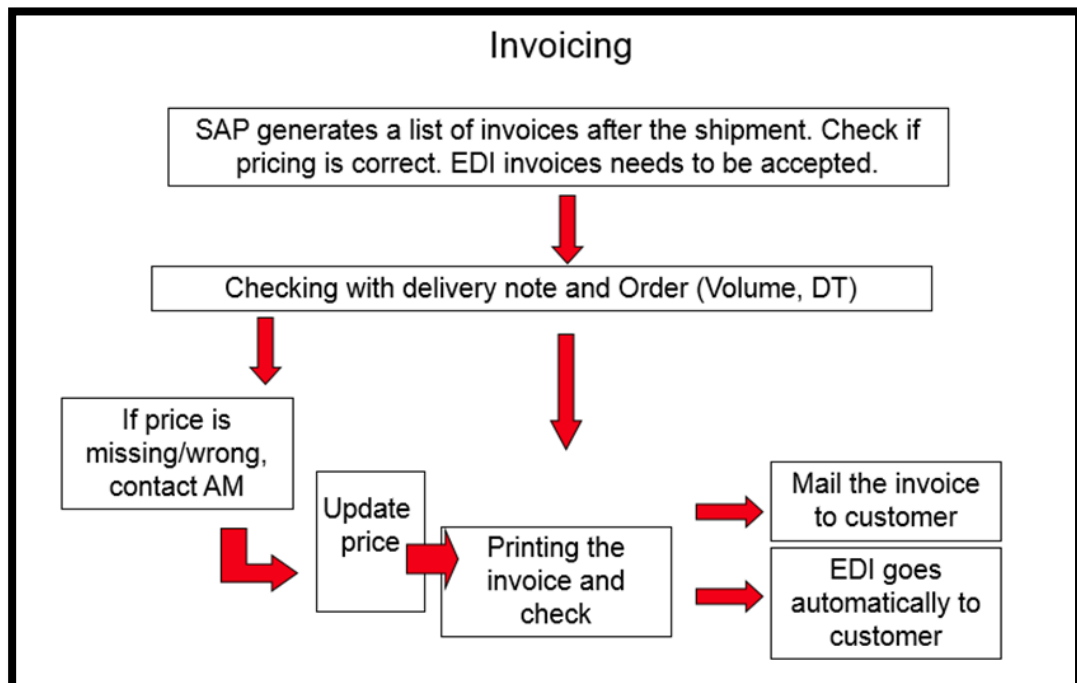
Work assignments

Service center / Sales back office	<ul style="list-style-type: none"> <li>Receiving the order and informing the engineering department (and salesman) about it</li> <li>Establishment of a new customer</li> <li>Entering info record and prices to the SAP (+other sales master data)</li> <li>Entering sales order to the SAP and confirming it to the customer</li> <li>Invoicing the trial casts and model</li> </ul>
Engineering	<ul style="list-style-type: none"> <li>Participating in to the contract review with salesman</li> <li>Establishing the product and the model, opening the item to the SAP (possible to centralize)</li> <li>Informing SBO about the delivery time</li> <li>Receiving the model, making trial cast card</li> <li>Documentation, PPAP</li> </ul>
Salesman	<ul style="list-style-type: none"> <li>Participating in to the contract review with engineering</li> <li>Confirming the itemized sales price to SBO</li> </ul>
Production	<ul style="list-style-type: none"> <li>Changing the engineering order to production order</li> <li>Manufacturing and shipment</li> </ul>

Appendix 2. Price List Procedure the Netherlands (Data 1).

Price List Procedure				
Sales Backoffice	Account Mgr	SBO Manager	Finance	
Open Current Price List from Customer				<b>Legenda</b>  Task; describes the task
Save as next quarter				
Add new quarterly MTZ/ETZ-values in Tab Surcharges		Put MTZ/ETZ-values in SAP		 Describes the decision Yes or No
On Main Sheet change the columns to the relevant months (and hide previous months)				 Shows a document
Print off Price List and double check prices with SAP - make amendments where necessary*				<i>* This can be a price increase per product or per customer Also double check all terms &amp; conditions on Price List and Master File.</i>
Print off SAP-report (ZSDPricing)				
Send Price List in PDF-format to the customer				
Put price list with ticked-off ZSDPricing-List in Lever arch file				
Update relevant columns in the Master file				
		Update Pricing Date of all Orders: via Winshuttle		
		Sent Info with Reason to Finance of those customers blocked for Invoicing based on the Master file		
		Inform Finance Dept. Customer can be invoiced again based on Master File!		
				

## Appendix 3. CSC manual Helsinki (Data 1).



### Appendix 4. New Part Introduction Form – Netherlands (Data 1).

**New part introduction FORM**      **Version 2015-01-26**

Save document on V:directory, foundry: Customer / Casting number / general info / 01 Order acceptance / 02 OAM documents  
 Send an email to the next person(s) once details have been filled out and saved.

Customer name	0		
Customer number (sold SAP)			
Ship to SAP code			
Accountmanager	0		
Customer service Employee			
NPI engineer	0		
Part Description	0		
Foundry	0		
Material	0		
Pcs per year	0		
Date	23/04/2016		

*FORWARD TO NPI ENG/KEY USER  
Send order of machined parts to Marcel Spijkers*

<b>SAP NUMBERS</b>	Rough Part	Machined Part
Pattern number		
Drawing number (rev. no)		
Final SAP number		
Weight		

<b>PACKAGING</b>	Casting	WMS	CPV
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Standard packaging quantity			

*FORWARD TO NPI ENG & CSC*

<b>CUSTOMER SERVICE CENTER</b>	
Create Customer info record of final sales product VD51	<input type="checkbox"/>
Add delivery tolerance in VD51 (+/- tol. by double clicking part)	<input type="checkbox"/>
Add Sales price in VK11	<input type="checkbox"/>
<i>If machined product:</i>	
Create customer info record for rough casting at customer machining	<input type="checkbox"/>
Add principal code in Customer info record machining	<input type="checkbox"/>

<b>FOUNDRY</b>	SAP nr.	MM	BOM	Routing
Create MM Core set		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Create MM Core set		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Create MM Core set		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Create MM Core set		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Create MM Patern		<input type="checkbox"/>		
Create moulded part /11		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Create grinded part /12		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Create painted part /13		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*FORWARD TO MACHINING ENGINEER*

<b>MACHINING</b>	Subcontractor name	Cost price	Transport costs	Incoterms	Leadtime	Min. Batch size	SAP nr.	MM	BOM	Routing	PIR	Schedule	Source List	
Extend MM rough part								<input type="checkbox"/>				55...	<input type="checkbox"/>	
First subcontracting number			FCA					<input type="checkbox"/>	<input type="checkbox"/>			53.....	55.....	<input type="checkbox"/>
Subcontractor po text & offer date														
Second subcontracting number			FCA					<input type="checkbox"/>	<input type="checkbox"/>			53.....	55.....	<input type="checkbox"/>
Subcontractor po text & offer date														
Boat/Container (transit number)								<input type="checkbox"/>	<input type="checkbox"/>			53.....	55.....	<input type="checkbox"/>
Warehouse number								<input type="checkbox"/>	<input type="checkbox"/>			53.....	55.....	<input type="checkbox"/>

*FORWARD TO TRUDY*      *FORWARD TO FINANCE*

<b>FINANCE</b>	
Cost roll up	<input type="checkbox"/> RETURN TO NPI ENGINEER. CC naar QA department

**PROCESS FLOW**

```

    graph TD
      CSC1[CSC] --> NPI1[NPI engineer/key user SAP (roger)]
      NPI1 --> NPI2[NPI Engineer]
      NPI2 --> CSC2[CSC]
      CSC2 --> ME[Mach. engineer (m.spijkers)]
      ME --> MM[MM key user (Trudy)]
      MM --> FIN[Finance (Peter vd Straten)]
      FIN --> SONJA[In case of machined or Trading part cc to Sonja]
      NPI2 --> ME
      CSC2 --> ME
      ME --> FIN
      FIN --> ME
    
```

## Appendix 5. Data collection the NL (Data 1-3).

E-mails follow up

Feb 2016  
CSC Manager NL

I have some questions about the procedure you sent to me.

As the procedure is written is how you are currently working? *yes*

The price you send to the customer is the price that comes to the SAP report or the price that is listed in the excel file? *We send the excel file to the customer. Price in excel and SAP are equal as we check them before we send the pricelist to the customer.*

Sales people have access to the lever arch files you keep? *Yes, we have a common storage drive (digital & paper).* There are stored SAP files or the excel master files? *Both. The excel and the "ticked off" SAP print.*

I have enclosed the mapping process we are doing in Helsinki. Could you please see it and check if you work alike?

We've found so far here in Helsinki several issues with the process as it is now. I copy them so you can tell me if you have similar problems in Netherlands.

(Helsinki).

Users CSC:

Difficulty when producing the invoices since differences arise from the price agreed with the customer and the price in the SAP. Every invoice has to be check before being issued. *As CSC is updating the excel pricelists and SAP, we don't have any differences. I don't understand the differences in Finland, as there's an agreed Index agreement which have fixed values which are both known at CSC and AM.*

- When checking those differences, it may be hard to find the internal number so they have to find it with the customer internal number (time consuming activity). *That's why the component SAP number is mandatory on the pricelist template. It has to be in there, otherwise It's indeed a VERY time consuming activity.*
- Lack of security when dealing with excel since changes can't be track and also can be done even unintentionally. *We always save the file with a new revision number once changes are made. History is kept.*

Sales (Problems when using SAP list)

- Don't want to use the SAP since is not very friendly. They need to remember the customer's code for example. *In the excel list we also mention the SAP customer number. But is there a pricelist which can be sent to customers from SAP? It's not known here that there is such a possibility. At BV sales is not involved in the price update process (during the year when MTZ values are updated). Only when an increase in the beginning of the year has to be added, but then still AM mentions the % and we update the pricelists.*

*Mandatory is the usage of our pricelist template. Only then we are able to do the price-list & SAP update for the account manager. We also face the most problems with external account managers, for which we have to update the prices, and are not using our template.*

March 2016  
CSC Manager NL

*It is true that the first set up to fill out these templates costs quite some time. On the other hand, if it's there, the updates are really easy and quickly done. It means that the CSC does not have to check all prices manually one by one in future, which is currently costing them a lot of time. But it's of course up to them.*

*I wasn't aware of the SAP template (until you told me a couple of weeks ago), so I need to check that option. The excel is our double check and as we do have all templates already it's not too much work to update them. But of course if SAP is working, we could try and use it. Can you please send me an example of a pricelist from SAP to see if it has a customer friendly layout?*

April 2016  
SCMD NL

*Thank you once again for this encouraging feedback, it certainly appears that your endeavours are going to be paying off (if not straight away, but certainly within the coming weeks). I will add this to my agenda to discuss through with CSC when I am next in the Netherlands.*


## Appendix 6. Instruction: How to Print prices from SAP.

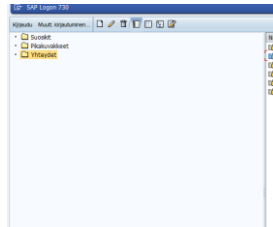
### Generating price lists from SAP


**Objective:** this instruction aims to explain how to generate the price list from SAP in order to use this information in the templet to be sent to the customers with the values that are going to be invoiced according to the system.

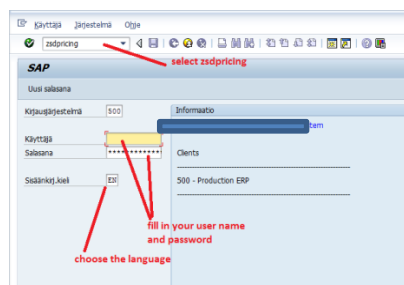
**Users:** Sales, Customer service Centers.

### Work instruction


Enter the program by using the SAP logon icon , and then choose the PRD to access to the system.

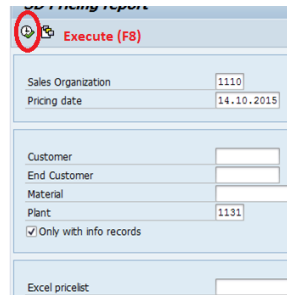
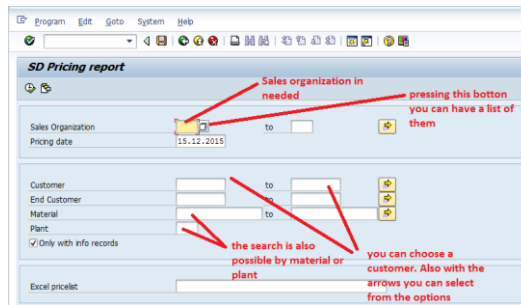


Enter your username and password, you can also choose the language. Type or select the “zsdpricing” from the screen and press enter or 

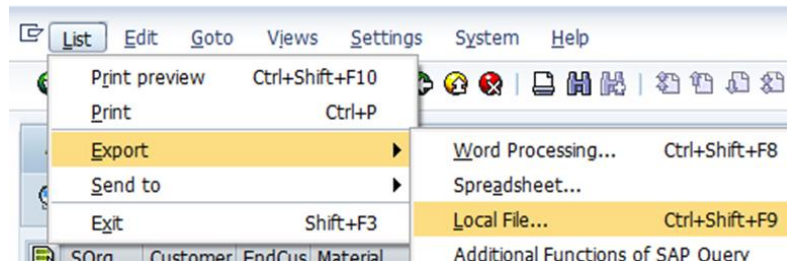


Now you are in the pricing report section. Here you need to fill in the sales organization. If you want several to be selected press the yellow arrow and add the units. Mind that sales organizations from 1010 to 1060 are obsolete. You can also make the list by a specific product or plant. Once you have finished,

press the executing button. 



Once you have the price list, you can export it by pressing List, export, local file as it is shown in the picture.



Finally you can save it as a spreadsheet in your personal folders.

