

# Value-based pricing

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*A systematic approach to improve price setting*

This is a public version. If needed, the company name, products names, employee names are replaced by fictive names. Besides, some section are completely removed.



# Company X

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*Department X*

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Title: A systematic approach to improve price setting

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## Management summary

Company X's Department X is not making a profit. Due to this fact, Company X has started several initiatives to reach 'break-even' in 2018. One of these initiatives is to realize a profit increase of 1 million euros by active price management. Currently, the final market price is determined by a list price multiplied by a factor, called a multiplier. This multiplier is only based on country and not on theoretical sources. In this research, the core problem is that it is not clear which variables determine the 'right' price setting. The 'right' price means the winning price, while maintaining position and current business performance. The main research question is:

*What are the core variables with the largest impact on the price setting of Company X for product family X and how can these variables be used as a systematic approach for active pricing?*

First, we investigated the current situation with respect to several aspects of Company X, namely: market position, price elasticity, pricing strategy, pricing method and value position. In this research, we investigated product family X, which consists of Product X.1 and X.2. The market position of this product family is market development. So, they want to enter new markets with existing products. Further, the price elasticity of product family X is hard to determine, because in general Products X.1 and X.2 are Engineered to Order. Moreover, Company X promotes the value-based pricing strategy. This means that they have to take the customer perspective more into account. According to the value positioning strategies of Treacy and Wiersema (1993), the strategy Company X should pursue is the customer intimacy strategy. This means that Company X wants loyal customers and to deliver the best customer solution. The pricing method they have to use, is the method of the Total Economic Value. This method uses a Reference Value and a Differentiation Value. The formula of this method is as follows:

$$\text{Total Economic Value} = \text{Reference Value} + \text{Differentiation Value}$$

Within this research, we derive this to a formula for calculating the final market price. This derived formula is as follows:

$$\text{Final market price} = \text{List price} * (0.735 + \text{Differentiation value})$$

Where the list price is a price set by Company X itself and the Differentiation value is determined by the variables investigated in this research. The correction factor of 0.735 is explained by the fact of the current average multiplier in a range from 0.47 to 1.00. The Differentiation value is the part of the formula we focus on in this research.

The core variables that determine this Differentiation Value are listed in the table below with a small explanation. These variables are based on data analysis, interviews and theories. In this table, we can also see the weights per variable. The weights are determined by using the Analytical Hierarchy Process and retrieved by a survey among 25 sales people of Company X. Position and country are not taken into account with determining the weights because most sales are local and position always causes a positive influence on the price.

Number	Variable	Explanation	Weight ( $W_i$ )	Score ( $S_i$ )
1	Position	Ecofriendly	-	[0.00; 0.07]
2	Country	-	-	[-0.08; 0.08]
3	Customer relationship	New or existing customer	0.349	[0.800; 1.150]
4	Volume	Project or contract	0.156	[0.800; 1.100]
5	Segment	Market segment	0.068	[0.900; 1.100]
6	Sales process	Moment of customer contact	0.272	[0.800; 1.150]
7	Competitors	Number of competitors	0.156	[0.850; 1.100]

Furthermore, per variable we also determined the possible scores. The range of the scores are also listed in the table above. Next, they are multiplied by their weight to obtain the Differentiation value. The Differentiation value is calculated by the following formula:

$$\text{Differentiation value} = S_1 + S_2 - (1 - (W_3 * S_3 + W_4 * S_4 + W_5 * S_5 + W_6 * S_6 + W_7 * S_7))$$

This formula calculates the Differentiation value which can be used in the formula of the final market price. The '0.735 + DV' part is restricted to 0.470 on the lower side and 1.000 on the upper side. When the market price is already known, it can be used as a comparison with the calculated market price. Now, we can conclude that the variables in the table below have the largest impact on the price, we could formulate some recommendations for Company X. We recommend the following to Company X:

- Company X should use this model as a starting point for pricing more actively.
- Before they decide to use the model definitively, they should test it over a certain period of time.
- When deciding to use it definitively, Company X should update the model a few times per year, because for example economic situations could change in countries and segments.
- Currently, Company X does not pursue a clear strategy. In future they have to define their strategy clearly.

## Preface

The report before you is the result of my graduation assignment of the Bachelor of Science Industrial Engineering and Management at the University of Twente. I did this assignment at Company X in Place X at the Department X. During this research I investigated how Company X can do their price setting in a better way.

First of all, I would like to thank Company X, who gave me the opportunity to do my Bachelor assignment at their company. Besides, I would like to thank, my supervisor at Company X, Manager Marketing and Product lines for his help and feedback during my research. Also I would like to thank all the employees of Company X for their help and input to get to this result.

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I hope reading this report will enjoy you.

Melle Edens

Enschede, December 2016





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## List of abbreviations

ATO = Assemble To Order

ETO = Engineer to Order

TEV = Total Economic Value

RV = Reference Value

DV = Differentiation Value

PDV = Positive Differentiation Value

NDV = Negative Differentiation Value

CPV = Customer Perceived Value

kV = kilovolt

PED = Price Elasticity of Demand

AHP = Analytical Hierarchy Process

CI = Consistency Index

RI = Random Index

DMU = Decision Making Unit

OPEX = Operational Excellence

CCPI = Climate Change Performance Index



## 1. Introduction

We introduce the company and present the initial assignment. Subsequently, we describe the problem statement and develop the research design.

### 1.1. Company X

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Figure 1 Organogram Company X

### 1.2. Assignment

#### 1.2.1. Initial assignment

In this chapter we describe the initial assignment stated by Company X. Some adjustments have been made, because of some inconsistencies noticed later in the research. The following description was initially given:

*“Problem: No structured and fact based pricing model that helps increasing profitability. The current pricing strategy of Company X is not based on theoretical sources.*

*As Company X sells its systems and services to various customers in various segments and countries per system so called list prices per panel and option are defined. To generate the final market price, list prices are multiplied by a factor. This factor is called a multiplier. Currently, the systems and services products within Company X’s department X use solely standard multipliers per country.*

*The average hit rate of Company X’s offerings is around 5-10% depending on the system and service. Practice shows that in case thorough analysis (application, competitors, benchmark, tendering phases, ....) is done on the offering the chances to win the project are increasing.*

**Assignment:**

*Company X’s department X.1 are not making profit. Based on this several initiatives are started divided over different departments to become profitable again. The initiative for the X department is to create at least a 1% profit increase by active price management in 2018. This can be done by looking at several aspects which can influence the price setting.”*

#### 1.2.2. Explanation assignment

As shown above, Company X is not making profit at the moment concerning Department X.1. At the department Y an initiative is deployed to increase the Department X.1 profitability. This initiative has to realize 1% extra profit margin in 2018 as goal by active price management. This 1% extra profit margin comes down to approximately 1 million euros.

This goal has to be realized with a structured and fact-based pricing model through which Company X can define the best winning price. This model needs a certain input to generate the best price as output. The input contains of several variables which have an impact on setting the price.

The assignment means that we investigate which variables have an impact on the multiplier and thus on the price setting. Furthermore, we investigate how these variables relate to each other. They have to form a basis for a systematic approach Company X can use when defining their prices. With this systematic

approach, Company X should improve their hit-rate and increase their profitability by active price management.

### 1.3. Problem statement

In this sub section we describe the problem statement. First a problem cluster is made to investigate the relevant problems with their interrelationships. Subsequently, we define the core problem this research is focused on.

#### 1.3.1. Problem cluster

Below in Figure 2 the problem cluster is shown. In this problem cluster we mapped all relevant problems with their relationships (Heerkens & van Winden, 2012). The action problem where the cluster starts is the fact that Company X's Department X.1 is not making profit. All the problems identified during the research are listed in Appendix A.

---- Confidential -----

Figure 2 Problem cluster (2016).

#### 1.3.2. Explanation problem cluster and core problem

After developing the problem cluster, we can formulate the core problem of this research. According to Figure 2 there are three problems without a cause. The costs, which are too high, are also an important issue, but do not fall within the scope of this assignment. The rectangle with other issues means that there are a lot of more problems on this side of the problem cluster, but these are not relevant. The problem cluster continues with the insufficient revenues. There are 3 problems without a cause. The first candidate core problem is the unclear value position. This problem plays a supporting role in this research, but it is not the core problem. This problem can only be solved from a higher level in the organization. However, it must be noticed that this problem is a factor that has to be taken into account for this research as sub problem. The second candidate problem is the low attention which is given to pricing in general. However, this problem is not the core problem, because this can only be solved if there is a structured and fact-based pricing model. This model will be developed in the future, so the solution for this problem does not fall within the scope of this research.

With the elimination of these two candidates, the only remaining candidate is the problem of the unclear variables. The core problem can be defined as follows:

*It is not clear which variables determine the 'right' price.*

In this case, the right price means the winning price while maintaining position and current business performance. Maintaining position means that the price cannot be too low, otherwise customers of Company X could think Company X does not offer a premium product. The business performance means that the current sales are maintained and there is a healthy sales-mix to spread the risk of huge sales fluctuations when a customer is leaving. This research is a starting point for Company X for value-based pricing. When the input variables are known, Company X can develop a model to do their price setting in a more efficient way. In this case, efficient means the best winning price.



## 1.4. Research design

In this section, we develop the research design. First, the research objective is defined with the deliverables of this objective. After that, we determine the scope of this research to narrow it down. Further, we define the main research question with the relevant sub questions. Next to that, this section describes the methods of data gathering and analysis used in this research. When this is all clear, we can create an overview of this research.

### 1.4.1. Objective and deliverables

With the core problem defined, we can also determine the goal of this research.

#### Research objective:

*Develop a systematic approach for determining the right multiplier to increase the Department X.1 profitability so Company X can use it for pricing more actively in the future. With this systematic approach Company X can determine their multiplier more accurately and so increase their revenues.*

It has to be noticed, that this research is a first step in the direction of pricing more actively. Company X can use this approach as a part of a greater project.

With the determination of the research objective, the deliverables of this research are evident.

- Price success variables including the impact and score per variable.
- A supporting report with recommendations for Company X.

### 1.4.2. Scope

Due to the time constraint of this research, it has to be narrowed down. The following limitations are set for this research:

- We select the variables based on the time duration of one year.
- We only focused on the sales profit side.
- We did not focused on the manufacturing and operating profit side.
- We only focused on the variables which have an impact.
- We do not develop a pricing tool.
- We maintained the current sales level.
- We only investigated the key countries.
- We only focused on product family X.

#### Description Product X.1 and X.2

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Figure 3 Product X.1 (left) and Product X.2 E(right) (Company X, 2016).

### 1.4.3. Research questions

With the core problem defined, the research objective known and the scope set, we can determine the research questions. Firstly, we determine the main research question. According to the core problem, it is evident that Company X wants to clarify which variables play a role in the price setting and which are the most important. So they can determine the price more actively instead of reactive pricing. We determine the main research question as follows:

*What are the core variables with the largest impact on the price setting of Company X for product family X and how can these variables be used as a systematic approach for active pricing?*

As the main research question is defined, we can determine the sub questions. With these sub questions, we can formulate an answer to the main research question. First of all, there are some theoretical issues which have to be clarified. It is important to know how the principle of price elasticity of demand works. When knowing this, the forecasts can be made more accurately. Furthermore, there is some literature knowledge needed to determine the core variables. It is important to know which main pricing strategies are known to determine Company X's pricing strategy. Moreover, the value position theories have to be figured out. At last, theories about criteria analysis are needed for determining the impact per variable. Therefore, we set the following sub questions:

1. *What is price elasticity of demand and how can it be used to increase revenues?*
2. *What are the main pricing strategies known in the literature?*
3. *Which principles of value positioning are known in the literature?*
4. *Which criteria analysis methods applicable are known in the literature?*

After this, we can describe the current situation of Company X. First, we describe their market position and price elasticity of demand with respect to product family X. Next to that, we determine and explain their pricing strategy and method. Subsequently, we discuss the value position of Company X. At last, we define all the variables investigated with qualitative research. Therefore, we define the following sub questions:

5. *What is the current market position of Company X, with respect to product family X?*
6. *What is the price elasticity of demand, with respect to product family X?*
7. *What is the value position of Company X?*
8. *What is the pricing strategy and method of Company X?*
9. *Which are the variables that can identify the core variables in the future model?*

Furthermore, the variables have to be selected for defining a systematic approach for Company X. First, we select the core variables out of the list of all possible variables and their relationships to won and lost orders. Subsequently, we investigate the impact and score per core variable. Therefore, we define the next four sub questions:

- 10. What are the core variables which have impact on the price setting for the future model?*
- 11. What is the relation per variable to a won or lost order?*
- 12. What is the impact per variable on the final market price?*
- 13. What is the range of values per variable?*

#### 1.4.4. Methods of data gathering and analysis

In Table 1, we identify the used methods of data gathering and analyzing.

Data gathering/analyzing method	Section	Explanation
Literature study (data gathering)	2	The literature study is used to create a theoretical framework.
Interview (data gathering)	3	We use interviews to create a better view of some aspects of the company.
Desk research (data gathering)	3	We also do some desk research to create a better view of the product family and the pricing strategy and method.
Desk research (data analyzing)	4	We do also some desk research with respect to data analyzing. This consists of win/loss analyses for determining the variables.
Survey (data gathering)	4	We conduct a survey to determine the weight per variable.
Criteria analysis (data analyzing)	4	We measure the weight per variable by using a criteria analysis.

Table 1 Methods of data gathering/analyzing.

#### 1.4.5. Overview report

In this sub section, we show the overview of this report. Table 2 shows the sections with their subjects treated.

Overview report	
Section 1	Introduction <ul style="list-style-type: none"><li>- Introduction company and assignment</li><li>- Problem statement</li><li>- Research design</li></ul>
Section 2	Theoretical framework <ul style="list-style-type: none"><li>- Price elasticity of demand</li><li>- Pricing strategies, positioning strategies</li><li>- Criteria analysis</li></ul>
Section 3	Current situation <ul style="list-style-type: none"><li>- Market position, pricing strategy, pricing method, value position, price elasticity</li><li>- Variables</li></ul>
Section 4	Systematic for pricing <ul style="list-style-type: none"><li>- Selection of variables</li><li>- Win/loss analysis</li><li>- Impact per variable</li><li>- Score per variable</li><li>- Model</li></ul>
Section 5	Conclusion and recommendations
Other	Bibliography and appendix

Table 2 Overview report.

First, we develop a theoretical framework to give an answer to the first four sub questions. Next, in Section 3 we describe the current situation of Company X on the basis of their market position and price elasticity with respect to the product family X. Further, we describe the pricing strategy, pricing method and value position of Company X. From this current situation, we create a list of all possible core variables. In Section 4, we develop the systematic approach for active pricing. First, we determine the core variables and do some win/loss analyses. After that, we determine the impact and score per variable to create a model. In the last section, we answer the main research question with the conclusion. After that, we give some recommendations for Company X and discuss further research options.

## 2. Theoretical framework

In this section we discuss the aspects of the literature. The following sub questions are treated in this section:

- *What is price elasticity of demand and how can it be used to increase revenues?*
- *What are the main pricing strategies known in the literature?*
- *Which principles of value positioning are known in the literature?*
- *Which criteria analysis methods applicable are known in the literature?*

### 2.1. Price elasticity of demand

In this subsection we discuss theories of price elasticity of demand. It is important to know how price elasticity of demand works, because with the systematic approach developed Company X have to play with the price. When knowing the principles of price elasticity of demand they can do a better price setting and forecast.

First of all, the definition of price elasticity of demand is discussed on the basis of several definitions. Secondly, the five types of price elasticity of demand are explained. At last, it is discussed how price elasticity of demand can be used by companies to increase their sales.

*“Price elasticity of demand is a measure of the relationship between a change in the quantity demanded of a particular good and a change in its price. Price elasticity of demand is a term in economics often used when discussing price sensitivity.” (Investopedia, 2016a).*

*“Price elasticity of demand (PED) shows the relationship between price and quantity demanded and provides a precise calculation of the effect of a change in price on quantity demanded.” (Economics Online, 2016).*

*“Most customers in most markets are sensitive to the price of a product or service, and the assumption is that more people will buy the product or service if it’s cheaper and less will buy it if it’s more expensive. But the phenomenon is more quantifiable than that, and price elasticity shows exactly how responsive customer demand is for a product based on its price.” (Gallo, 2015).*

From these definitions, we create a general definition: *Price elasticity of demand (PED) shows the degree of influence that price has on the demand of a product or service.*

Now the definition is clearly outlined, the method of calculating the price elasticity of demand is shortly described. The formula of calculating the price elasticity is as follows:

$$\text{Price elasticity of demand (PED)} = \frac{\text{small relative change in quantity demanded}}{\text{small relative change in price}} \text{ (Gallo, 2015).}$$

The outcome of this formula can have a value between zero and negative infinite. There are five types of price elasticity of demand.

- 1) **Perfectly elastic.** It is perfectly elastic as the value is negative infinite. This means that a small change in price causes a large change in demand. (Gallo, 2015).

- 2) **Perfectly inelastic.** It is perfectly inelastic as the value is zero. This is the opposite of the first type, so when something is perfectly inelastic a change in price causes no change in demand. (Gallo, 2015).
- 3) **Relatively elastic.** If it is relatively elastic, the value of PED is between -1 and negative infinite. This means that a proportional change in price is larger than the proportional change in demand. (Gallo, 2015).
- 4) **Relatively inelastic.** Relatively inelastic means that the change in price is smaller than the change in demand. The value of relatively inelastic is between 0 and -1. (Gallo, 2015).
- 5) **Unit elastic.** This means that the change in price is equal to the change in demand. Logically, the value of price elasticity is equal to -1. (Gallo, 2015).

It is important to know which of these types occur. Companies can use price elasticity of demand as a measuring tool. Price elasticity is a way of measuring how products and services of a company have unique and sustainable value for customer relative to competitors. So it shows a company how effective its marketing is. (Gallo, 2015).

As a company, the products and services have to be relatively inelastic, because then a change in price will most likely not cause a change in demand. For creating a relatively inelastic good, a company has to differentiate the product and make it useful for the customer. It is important to create a feeling of desire among customers, because price becomes less important in that case. On the other hand, if competitor offers a similar product, the product becomes more sensitive for price and thus more elastic. (Gallo, 2015).

## 2.2. Pricing strategies

Here, we discuss the main pricing strategies known in the literature. When knowing the main pricing strategies, we can determine the pricing strategy of Company X. This is important to define, because the core variables which are determined in Section 4 have to relate with the pricing strategy. In this subsection the following sub question is treated: *“What are the main pricing strategies?”*.

*“Pricing has a huge impact on profitability. Pricing strategies vary considerably across industries, countries and customers. Nevertheless, researchers generally concur that pricing strategies can be categorized into three groups:*

1. *Cost-based pricing*
2. *Competition-based pricing*
3. *Value-based pricing*

*Cost-based pricing derives from data from cost accounting. Competition-based pricing uses anticipated or observed price levels of competitors as primary source for setting prices and customer value-based pricing uses the value that a product or service delivers to a segment of customers as the main factor for setting prices. In Table 3, the three main strategies are shown with their definition, examples, strength, weaknesses and an overall evaluation.”* (Hinterhuber, 2008).

<b>Approaches to pricing</b>			
	<i>Cost-based pricing</i>	<i>Competition-based pricing</i>	<i>Value-based pricing</i>
<b>Definition</b>	<i>Cost based-pricing approaches determine prices primarily with data from cost accounting</i>	<i>Competition-based pricing approaches use anticipated or observed price levels of competitors as primary source for setting prices</i>	<i>Customer value-based pricing approaches use the value a product or service delivers to a predefined segment of customers as the main factor for setting prices</i>
<b>Examples</b>	<i>Cost-plus pricing, mark-up pricing, target-return pricing</i>	<i>Parallel pricing, umbrella pricing, penetration/skim pricing, Pricing according to average market prices</i>	<i>Perceived value pricing, MPerformance pricing</i>
<b>Main strength</b>	<i>Data readily available</i>	<i>Data readily available</i>	<i>Does take customer perspective into account</i>
<b>Main weaknesses</b>	<i>Does not take competition into account, Does not take customers (and customer willingness to pay) into account</i>	<i>Does not take customers (and customer willingness to pay) into account</i>	<i>Data are difficult to obtain and to interpret Customer value-driven pricing approach may lead to relatively high prices – need to take long-term profitability into account. Customer value is not a given, but needs to be communicated.</i>
<b>Overall evaluation</b>	<i>Overall weakest approach</i>	<i>Sub-optimal approach for setting prices; appropriate for commodities (if – and only if – products/services in question cannot be differentiated)</i>	<i>Overall best approach, direct link to customer needs</i>

Table 3 Pricing strategies (Hinterhuber, 2008).



## 2.3. Value positioning

Here, we discuss the theories about value positioning. When knowing these theories, the market position and value position of Company X can be determined. The core variables determined in Section 4 have to relate with these positions. In this section the following sub question is treated: *Which principles of value positioning are known in the literature?*

Igor Ansoff (1957) developed a matrix which can be used for defining the market strategy of a product or service. This matrix is shown in Figure 4. This matrix shows that there are 4 quadrants a product or service could be. These 4 quadrants are explained below. (Mindtools, 2016a).

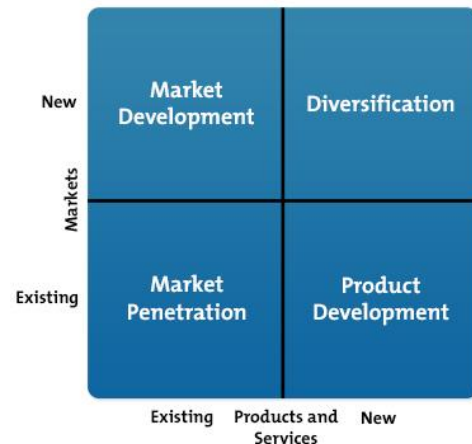


Figure 4 Ansoff matrix (Mindtools, 2016a).

*“Market penetration, in the lower left quadrant, is the safest of the four options. Here, you focus on expanding sales of your existing product in your existing market: you know the product works, and the market holds few surprises for you.”*

*“Product development, in the lower right quadrant, is slightly more risky, because you're introducing a new product into your existing market.”*

*“With market development, in the upper left quadrant, you're putting an existing product into an entirely new market. You can do this by finding a new use for the product, or by adding new features or benefits to it.”*

*“Diversification, in the upper right quadrant, is the riskiest of the four options, because you're introducing a new, unproven product into an entirely new market that you may not fully understand.”*

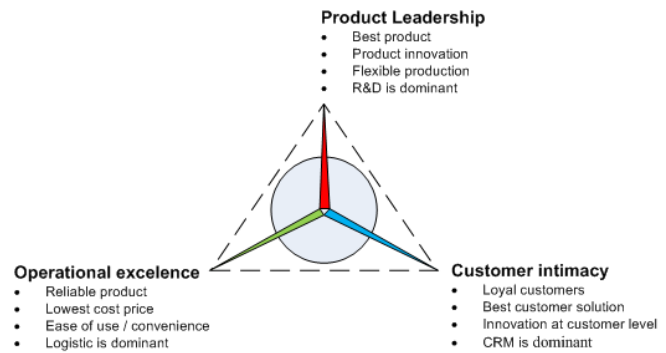


Figure 5 Porter's generic strategies (Mindtools, 2016b).

The most commonly known theory about value positioning to obtain competitive advantage is Porter's generic strategies, first discussed in 1985. These strategies are shown in Figure 5. *“A cost leadership strategy requires a firm to become the lowest cost producer of a product or service so that above-average profits are earned even though the price charged is not above the industry average. A differentiation strategy involves creating a customer perception that a product or services is superior to that of other firms, based on brand, quality, and performance, so that a premium price can be charged to customers. A focus strategy involves the use of either a differentiation or cost leadership strategy in a narrow market segment. Porter goes on to argue that a firm must*

*choose between a differentiation and a cost leadership strategy. To be “stuck in the middle” between the two is likely to result in failure.”*

In 1993, Treacy & Wiersema have extended the generic strategies of Porter (1985) to three value disciplines. As a company you have to be market leader in one these three disciplines and optimize the other two. In Figure 6 the triangle of Treacy & Wiersema (1993) is shown.



**Figure 6 Triangle of Treacy & Wiersema (Treacy & Wiersema, 1993).**

Treacy & Wiersema (1993) describe operational excellence as follows:

“The term “operational excellence” describes a specific strategic approach to the production and delivery of products and services. The objective of a company following this strategy is to lead its industry in price and convenience. Companies pursuing operational excellence are indefatigable in seeking ways to minimize overhead costs, to eliminate intermediate production steps, to reduce transaction and other “friction” costs, and to optimize business processes across functional and organizational boundaries. They focus on delivering their products or services to customers at competitive prices and with minimal inconvenience. Because they build their entire businesses around this goal, these organizations do not look or operate like other companies pursuing other value disciplines (p. 85).”

Treacy & Wiersema (1993) describe customer intimacy as follows:

“Those pursuing a strategy of customer intimacy continually tailor and shape products and services to fit an increasingly fine definition of the customer. This can be expensive, but customer-intimate companies are willing to spend now to build customer loyalty for the long term. They typically look at the customer’s lifetime value to the company, not the value of any single transaction. This is why employees in these companies will do almost anything – with little regard for initial cost – to make sure that each customer gets exactly what he or she really wants (pp. 87-88).”

Treacy & Wiersema describe product leadership as follows:

“Companies that pursue the third discipline, product leadership, strive to produce a continuous stream of state-of-the-art products and services. Reaching that goal requires them to challenge themselves in three ways. First, they must be creative. More than anything else, being creative means recognizing and embracing ideas that usually originate outside the company. Second, such innovative companies must commercialize their ideas quickly. To do so, all their business and management processes have to be engineered for speed. Third and most important, product leaders must relentlessly pursue new solutions to the problems that their own latest product or service has just solved. If anyone is going to render their technology obsolete, they prefer to do it themselves. Product leaders do not stop for self-congratulation; they are too busy raising the bar (pp. 89-90).”

## 2.4. Criteria analysis

Here, we discuss theories about criteria analysis. A good criteria analysis is needed for determining the impact per variable. In this section the following sub question is treated: *Which criteria analysis methods applicable are known in the literature?*

The most common known theory about criteria analysis is the Analytical Hierarchy Process (AHP) developed by Thomas Saaty in 1988 (Winston, 2004). The AHP is a model that can be used to make decisions in situations involving more than one criterion (Winston, 2004).

Winston (2004) says: “When multiple objectives are important to a decision maker, it may be difficult to choose between alternatives.”

From this statement, it is concluded that the objectives are the criteria and an alternative is an order which Company X has to validate. The AHP is a model which can be used to make these decisions for Company X.

We cite the following text phrased from Winston (2004) directly:

“Within this AHP there are several steps. Suppose there are  $n$  objectives. Then you have an  $n \times n$  matrix, also known as the pairwise comparison matrix  $A$ . The entry in row  $i$  and column  $j$  of  $A$ ,  $a_{ij}$ , indicates how much more important objective  $i$  is than objective  $j$ . The pairwise comparison matrix  $A$  is as follows:

$$A = \begin{bmatrix} \frac{w_1}{w_1} & \dots & \frac{w_1}{w_n} \\ \frac{w_1}{w_1} & \dots & \frac{w_1}{w_n} \\ \vdots & \ddots & \vdots \\ \frac{w_n}{w_1} & \dots & \frac{w_n}{w_n} \end{bmatrix}$$

Where  $w_1$  is weight of objective 1 and so on. Saaty (1980) developed a table for the entries in a pairwise comparison matrix. This table states the importance of objective  $i$  in comparison with objective  $j$ . In Table 4, the interpretation of these entries is shown.

Value of $a_{ij}$	Interpretation
1	Objective $i$ and $j$ are of equal importance.
3	Objective $i$ is weakly more important than objective $j$ .
5	Objective $i$ is strongly more important than objective $j$ .
7	Objective $i$ is very strongly or demonstrably more important than objective $j$ .
9	Objective $i$ is absolutely more important than objective $j$ .
2,4,6,8	Intermediate values.

Table 4 Interpretation of entries in a Pairwise Comparison Matrix (Winston, 2004).

When having the comparison matrix  $A$ , the vector  $w = [w_1 \ w_2 \ .. \ w_n]$  has to be determined. This vector shows the weights of each objective. Consider the system of  $n$  equations

$$Aw^T = \Delta w^T$$

Where the eigenvalue of  $A$ ,  $\Delta$ , is an unknown number and  $w^T$  is an unknown  $n$ -dimensional column vector. For any number  $\Delta$ , the system always has the trivial solution  $w = [0 \ 0 \dots 0]$ . It can be shown that if  $A$  is the pairwise comparison matrix of a perfectly consistent decision maker and we do not allow  $\Delta = 0$ , then the only nontrivial solution to the system is  $\Delta = n$  and  $w = [w_1 \ w_2 \dots w_n]$ . This shows that for a consistent decision maker, the weights  $w_i$  can be obtained from the only nontrivial solution to the system. Now suppose that the decision maker is not perfectly consistent. Let  $\Delta_{\max}$  be the largest number for which the system has a nontrivial solution  $w_{\max}$ . If the decision maker's comparisons do not deviate very much from perfect consistency, it can be expected that  $\Delta_{\max}$  is close to  $n$  and  $w_{\max}$  is close to  $w$ . Saaty verified that this intuition is indeed correct and suggested approximating  $w$  by  $w_{\max}$ . Saaty also proposed measuring the decision maker's consistency by looking how close  $\Delta_{\max}$  is to  $n$ .

For this above there is a simplified method that can be used to approximate  $\Delta_{\max}$  and  $w_{\max}$  and an index of consistency. For approximating  $w_{\max}$  there is a two-step procedure.

1. For each of the columns of the pairwise comparison matrix  $A$ , divide each entry in column  $i$  by the sum of the entries in column  $i$ . This creates a new matrix,  $A_{\text{norm}}$ . In this matrix, the sum of each column should be equal to 1.
2. The second step is to find an approximation to  $w_{\max}$ . Find an estimation of  $w_i$  by calculating the average of the entries in row  $i$  of  $A_{\text{norm}}$ .

After these steps, the weight per objective is known. Subsequently, the decision maker's comparisons have to be checked on consistency. This is a four-step procedure.

1. The first step is to compute  $Aw^T$ . This is done by multiplying the matrix of  $A$  by the column vector  $w$ . The result of this is a new column vector.
2. The second step is to compute the following:  $\frac{1}{n} \sum_{i=1}^n \frac{\text{ith entry in } Aw^T}{\text{ith entry in } w^T}$
3. Thirdly, the consistency index (CI) has to be computed. This is calculated as follows:  $\text{Consistency Index} = \frac{(\text{Step 2 result}) - n}{n-1}$
4. At last, the CI has to be compared with the Random Index (RI). This RI is dependent on the value of  $n$ . The values of RI are shown in Table 5. If CI is sufficiently small, the decision maker's comparisons are probably consistent enough to give useful estimates of the weights for the objective function. If  $\frac{CI}{RI} < 0.10$ , the degree of consistency is satisfactory. When it is higher than 0.10, serious inconsistencies may exist."

$n$	RI
2	0
3	0.58
4	0.90
5	1.12
6	1.24
7	1.32
8	1.41
9	1.45
10	1.51

Table 5 Values of the Random Index (RI) (Winston, 2004).

In Appendix C, we show an example of how the AHP works.

## 2.5. Conclusion

The first sub question can be answered with a definition of price elasticity of demand and how companies have to use it as follows:

**Definition:** *Price elasticity of demand (PED) shows how large the influence of price is on the demand of a product or service.*

Price elasticity can be used as a measuring tool for companies. They can use it to measure how effective they are at marketing. It tells a company how they can play with the price knowing how the market will react to a price change. When a product or service is relatively inelastic a company can change the price without much change in demand.

Secondly, the framework distinguishes three main pricing strategies, according to Hinterhuber (2008). The first one is cost-plus pricing, this is a traditional pricing strategy. This strategy is only focused on the cost side of a company and does not take customers into account. It can be concluded that this is a strategy which is outdated and overall the weakest approach. The second one is competition-based pricing, this is a strategy which focuses on the price setting of competitors. This one also does not take customers value into account. The third strategy is the value-based pricing. The main advantage of this strategy is that it does take customer value into account. This is overall the best approach, because it is linked to the customer needs.

Thirdly, the value position of a company can be done on the basis of Porter's generic strategies (1985). Extended to this strategy there is the triangle of Treacy & Wiersema (1993). This is a well-known strategy for value positioning. This consists of three disciplines: Product leadership, Operational Excellence and Customer Intimacy. This triangle of Treacy & Wiersema (1993) is used in Section 3 to determine the value position of Company X. Also in Section 3, the matrix of Ansoff (1957) is used to determine the market position of product family X on the basis of the four quadrants.

At last, the criteria analysis that is applicable to this problem is the Analytical Hierarchy Process of Saaty (1980). This model can be used to calculate the weights of each criterion by set them off against each other. This model can be used to calculate the impact per variable and after that give a score per alternative, where an alternative is an order. In Section 4 this AHP is applied to determine the impact of the core variables. The AHP is only used to determine the weights.

### 3. Current situation

In this section, we describe the current situation of Company X. First, we describe the market position of Company X with respect to product family X. Furthermore, we discuss and explain the value position of the company. After that, we explain their pricing strategy and their current method of pricing. This is important for defining the variables later in the research. The sub questions answered in this section are:

- *What is the current market position of Company X, with respect to product family X?*
- *What is the price elasticity of demand, with respect to product family X?*
- *What is the value position of Company X?*
- *What is the pricing strategy and method of Company X?*
- *What are the variables that can identify the core variables in the future model?*

#### 3.1. Market position, price elasticity, pricing strategy, pricing method and value position of Company X

In this subsection, we discuss and explain the market position; price elasticity of demand with respect to product family X, pricing strategy, pricing method and value position of Company X. We formulate an answer to the 5<sup>th</sup>, 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> sub question in this section.

##### 3.1.1. Market position and price elasticity of Company X according to Product family X

Company X is active in the business to business market. At this moment Company X has a marginal market share in most countries. For product family X, only in the Netherlands, Sweden and Poland the market share is relatively high. The Netherlands are logically to clarify, because of the fact that Company X has acquitted Company Y in 20xx. Company Y was a Dutch company, so their market share was high in their home country. In Sweden and Poland their relatively high market share are clarify due to the fact of the maturity of the sales organizations and the strong position. Nevertheless, the overall market share of the products is marginal in Region X. The total market share is x.xx% (Company X, 2016c).

With respect to the matrix of Ansoff (1957), Product X.1 and X.2 can be placed in one of the four quadrants. They are existing products and Company X wants to enter new markets with these products. Therefore, it is clear that they should be placed in the quadrant of market development.

Product X.1 is mostly an Engineer To Order (ETO) product. ETO products are products based on more specified features, so they are distinct from each other. This causes an almost impossible determination of price elasticity. The rest are Assemble To Order (ATO) products. This is a business production strategy where products have a short production time and are customizable to a certain extent (Investopedia, 2016b). This strategy requires that standard parts are at hand but not assembled (Investopedia, 2016b). This assembling is done when the order is received (Investopedia, 2016b). Due to the fact that Product X.1 is an ETO product, the price elasticity of Product X.1 is very difficult to determine. There is certain price elasticity, but it is hard to define, because Product X.1 is not a Make To Stock product and the other Product X.1 products are Assemble To Order. For Product X.2 the price elasticity is even harder to determine, because Product X.2 is an complete Engineer To Order (ETO) product. In Figure 7, the current proportions of ETO and ATO are shown. In future, the Product X.1 proportions will be the same and for Product X.2 it will be 80% ETO and 20% ATO.

---- Confidential ----

Figure 7 ETO/ATO proportion Product X.1 and Product X.2 (Company X, 2016e).

### 3.1.2. Value position Company X

In this subsection, we discuss the value position of Company X on the basis of the value disciplines of Treacy & Wiersema (1993). Firstly, the current position is described, based on several interviews during this research. After that, the future value position of Company X is proposed, also based on several interviews. We outlined some statements to create a better view of the current position of Company X.

**Director business and market development:** *“Currently Company X is between product leadership and customer intimacy. Some products of Company X are quite innovative and we try to give the best solutions to our customer. OPEX is only possible if you increase your volume and standardize your production.”*

**Strategic pricing manager:** *“Currently Company X is a bit stuck in the middle, there is no clear vision which strategy to follow. In the future Company X has to focus on customer intimacy. Product leadership is not possible, because the quality and innovation of products cannot reach that level. OPEX is also not possible, because the costs cannot reduce to a level to compete with the competitors.”*

**Customer experience manager:** *“The last years Company X has shifted from customer intimacy to operational excellence. This is not where Company X should be. Product leadership is not an option, because Company X follows the market and is not innovative. Company X has to return to customer intimacy.”*

**Regional marketing manager:** *“At this moment Company X is between product leadership and customer intimacy. Company X has a broad knowledge and is customer focused. Operational excellence is moderate, this causes a lot of complaints about the quality of the product. In future Company X has to shift to operational excellence to survive.”*

**Sales manager:** *“Currently, Company X is shifted to operational excellence and the plant has got too much power. The department of operations does not take the customer into account. In the future, Company X has to focus on customer intimacy, because Company X cannot compete on price or product.”*

**Manager marketing and product lines:** *“Currently for Product X.1 they try to pursue the OPEX strategy, but due to the low market share it is not possible. Company X cannot compete on price, but should use a premium price. This premium price is based on good product quality and environmental friendliness.”*

**Supply chain manager:** *“Currently, Company X is stuck in the middle of the triangle. In the future they have to pursue a customer intimacy strategy, because Company X has not that innovative products and OPEX is not possible because there is too little standardization.”*

**Front-end engineer systems:** *“At this moment, Company X does not pursue a clear strategy. Due to that fact, they are quite stuck in the middle. Customer relationship is very important for Company X, so they have to follow the customer intimacy strategy in the future.”*



**Project manager:** *“At the moment Company X is quite stuck in the middle. They are a bit customer intimacy and operational excellence and a little bit product leadership. In the future Company X has to shift more to the product leadership side, because their products are of good quality and connect with the market.”*

**Key account manager:** *“Customer relationship is important in selling the products and services for Company X. Company X has to use a higher price than competitors. Company X has to follow a customer intimacy strategy.”*

**Conclusion:**

From these interviews, we observed that several opinions exist about the strategy Company X has to pursue. First, the interviewees agree Company X does not pursue a clear strategy. Three people say Company X operates in between customer intimacy and product leadership. One of the interviewees says Company X has shifted to operational excellence the last years, but not full to the operational excellence side. Four people say Company X is stuck in the middle. With these statements, it can be concluded that at this moment Company X is stuck in the middle. Within the organization not all people have the same idea about the future of Company X. This is a problem which has to be solved from a higher level in the organization. Due to the fact Company X is currently stuck in the middle, an assumption is made about the future strategy of Company X. This is because the strategy plays a role in selecting the variables.

In future, most people think Company X has to pursue a customer intimacy strategy. This is because Company X cannot compete on price. Moreover, at this moment Company X does not have the capabilities to follow an operational excellence strategy, because the volume is too low and there is too little standardization. Currently, the other possible strategy, product leadership, is not an option for Company X. The products are qualitatively good, but there is too little innovation to follow a product leadership strategy. According to the opinion of the interviewees, Company X has to follow a customer intimacy strategy. For defining the variables, it is assumed that Company X will follow this customer intimacy strategy.

### **3.1.3. Pricing strategy & method of Company X**

Now the market position of product family X and value position of Company X is clear, we can describe the pricing strategy and pricing method of Company X.

Currently the pricing strategy of Company X is quite reactive. When a price has to be determined or adjusted, it is not clear how this has to be done. Due to that fact, Company X has the ambition to shift to a more value-based strategy.

*“Within Company X the systematic of value based pricing is promoted. This systematic uses the value the customer wants to pay for the product and its features as bases for setting the market price (instead of the traditional cost price plus margin approach).”* (Company X, 2016)

In Figure 8 is the chain of value-based pricing shown. This chain shows that the product is based on the customer's needs.





Figure 8 Value-based pricing (lines, 2016).

According to Figure 8, this strategy is focused on the customer needs. This strategy is the most advanced strategy, but also the most difficult. It is hard to quantify the value the customer wants to pay for it. The pricing method Company X wants to use to define the final market price is the method of Total Economic Value (TEV). (Company X, 2006).

*“Total Economic Value is a tool to calculate and communicate the offering’s competitively distinct value. Total Economic Value is a monetary amount that provides the maximum credible price. Further, TEV includes the offering’s quantified benefits and compares the value of the offering with that of the closest alternative. At last, TEV communicates the offering’s value to the customer as monetary savings or increase in revenue.”* (Company X, 2006).

The following formula is used to calculate the Total Economic Value:

$$\text{Total Economic Value} = \text{Reference Value} + \text{Differentiation Value}$$

First, we explain the Reference Value (RV). There is a distinction of two situations within this RV. The first situation is when the market price is known. In this case the Reference Value is the price of the closest available competitor offering for the product or service, as identified by the customer. In the second situation the Reference Value is a list price set by Company X itself, because the reference values of competitors is unknown. However, in 90% of the cases the market price is unknown. Therefore, Company X wants a general model for the unknown market price and in case of the known RV, this will be used as a check. In case of this list price, it is rather complex. This list price has to be adjusted. We determine this adjusted list price by using the lowest market price Company X uses for a standard Product X.1 block. This is around 4250 Euros. Next, we use Company X’s price tool to determine which margin and multiplier belongs to this market price. We observed a multiplier of 0.47 and a margin of approximately 5%. We know that the maximum multiplier for a standard block is equal to 1.00. So, the range of the multiplier is [0.47; 1.00]. Now, we have to determine if this is also applicable for Product X.2. Because Product X.2 has no standard block, we have to use a mix of standard panels. So, the lowest market price is based on the lowest market price per panel. Next, we determine the multiplier and margin per panel. For the multiplier we compute the average multiplier and for the margin we compute the weighted average. The results of these calculations are 0.47 for the multiplier and approximately 6% margin. Therefore, we can assume that the Product X.1 and X.2 blocks have the same range of multipliers. So, the same method of adjusted list price can be used for both Product X.1 and X.2. In Appendix B, the data and drawings of the standard blocks can be found. Now this is clear, we have to determine the correction factor of this adjusted list price. From the range of [0.47; 1.00] we take the minimum and maximum multiplier and divide this by 2. This gives us a correction factor of 0.735. Further, in Table 6 we can see the two situations with their method and RV.

Market price	Method	Reference value
--------------	--------	-----------------

Known	Index price set by Company X (RV as a check)	List price*0.735
Unknown	Index price set by Company X	List price*0.735

Table 6 Market prices (lines, 2016).

Secondly, we explain the Differentiation Value (DV). In Company X's case this DV is the value that influences the correction factor. This part consists of two aspects: Positive Differentiation Value (PDV) and Negative Differentiation Value (NDV). The PDV is the added value above the Reference Value (Company X, 2006). The NDV is the value that gives Company X disadvantage (Company X, 2006). This means that the correction factor can be influenced positively and negatively.

*"The Total Economic Value is the maximum credible price Company X can use. Further, there is a Customer Perceived Value (CPV). This is the maximum amount the customer is willing to pay. It is important to know the gap between the TEV and CPV. This gap shows how wide or narrow the discrepancy is in customer perception. It is positive when the gap between the TEV and CPV is small."* (Company X, 2006). Currently, Company X does not pursue a value-based pricing strategy long enough to determine this CPV.

When looking at the price setting of Company X, they can use a derivative from the formula of the TEV for determining the final market price. The Reference Value is assumed to be fixed as the list price and the Differentiation Value is the part which can influence the final market price. The variables can have a positive or negative impact on the final market price. Hence, the DV is not split, but it is taken as one piece. In Figure 9, we show how this principle works. The calculation of the final market price for Company X is as follows:

$$\text{Final market price} = \text{List price} * (0.735 + \text{Differentiation value})$$

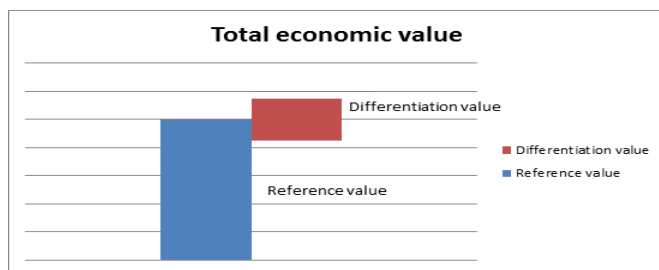


Figure 9 Total economic value (Company X, 2006).

### 3.2. Variables

In this subsection, we describe the variables investigated. We answer Sub-question 9: *"What are the variables which can be the core variables in the future model?"*. We explain all the variables, which could have an impact on the price. These perceived variables are based on several interviews held during the research. In Section 4 the core variables are definitively selected.

The variables below are all the perceived factors which could influence the price. From all these variables a selection is made according to their importance. In this section the variables are shown and explained in random order.

**Sales process:** This variable means the moment of entering the purchase funnel, in other words the moment of contact with the customer. Looking at Figure 10, there are four stages. The first one is 'learn', this means that the customer understands the possible needs. The second stage, define needs, is logically the stage where the customer is defining its needs. In the third stage, the options which correspond with the needs are assessed. These options are presented by the supplier, in this case Company X and its competitors. The last stage is when the customer makes a decision out of the possible options of stage three.

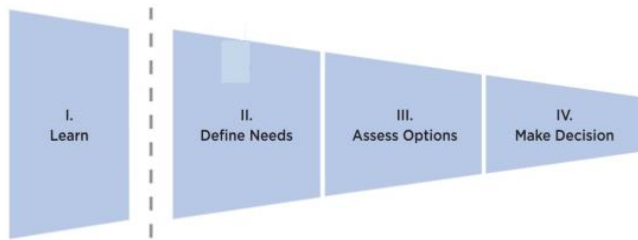


Figure 10 The purchase funnel (CEB Global, 2016).

**Volume:** This variable concerns the aspect of size of an order. There is a distinction between the sizes of an order. This varies from small orders to large projects or tenders. Tenders are contracts with companies that most of the time last for several years. So there is a distinction between projects and contracts. Within this projects, there are small, medium and large projects and within the contracts there are long and short contracts.

**Reputation:** This variable is about the image of the company in the first place. When the company has a good reputation, this can have a positive influence on the price. Secondly, there is a certain lead time image. This is not about the lead time itself, but the communication and reputation of the lead time. Customers care more about a good communication. Thirdly, the product image is an aspect. The quality of the product can have an influence on the price.

**Flexibility:** Flexibility in this case means the level of how flexible the account manager can be in its offering to the customer. A package deal can have influence on the price. A package deal makes it less transparent for the end customer. A package deal also means that the total price can rise.

**Country:** This is the country where the order takes place. Countries have their own price levels and therefore different multipliers.

**Segment:** This variable concerns the segment of the order. Within Company X there are several segments. The following segments are the core ones: Data Centers, Oil & Gas, Mining, Infrastructure, Healthcare, Utilities, Industries, Marine & Offshore, Commercial Institutes & Buildings and Universities (Company X, 2015b).

**Exactness:** This variable is about the exactness of the price. There are several options to set a price. There is distinction between a detailed price and budget quoting. Budget quoting is a global estimation of the price.

**Decision Making Unit (DMU):** This means all the persons playing a role in the purchasing process of the end customer. For example, when the procurement department plays an explicit role, price becomes more important. When an engineer plays an important role, specification is more important.

**Position:** This is about the position of Company X in the market. The quality of the products of Company X is for example something they use according to their position. Furthermore, eco-friendly solutions have the largest influence on the position. According to Porter (1980), Company X uses a product differentiation strategy, because they are not a cost leader and have products of better quality than their competitors.

**Organizational capabilities:** This variable is about the organization structure. First of all, local presence is an important aspect of this variable. For example, for each of the countries where Company X is present a sales organization is needed. Each of that department needs the necessary people, such as: project managers, sales people, service people etc. Further, maturity of these sales organizations is important. This concerns knowledge of the market, products and applications. The more mature the organization is, how higher the hit-rate will be.

**Competitors:** This is about the competitors which also are involved in the project. When a company knows as much as possible about their competitors, it can determine the market price more accurately. So the number of competitors has impact on the price.

**Customer relationship:** This is about new and existing customers of Company X. Within this new and existing customer there are also several degrees.

**Lead time:** Logically, this is the lead time of an order. The lead time means the time that a customer's order is established to delivering the order. A long lead time will cause a decrease in price and vice versa. This is a minimum requirement needed for obtaining the order.

**Specification:** This is about the specification of what a customer wants. This contains the technical specifications of a product or service. This is a minimum requirement needed for obtaining the order.

**Sales channel:** When Company X gets a request for a quotation, two situations may occur. The first situation is a request directly from the end user and the other situation is a request from a contractor or consultant acting as a partner. The first situation is more beneficial than the second situation, because it is more specified to the customer's needs and there is no negotiator in between Company X and the end user.

### 3.3. Conclusion

The sub questions related to Section 3 can now be answered. First of all, we determine the market position of Company X. According to Ansoff's matrix (1957) it can be concluded that the products Product X.1 and X.2 are in the quadrant of market development. For the future Company X wants to enter new markets with these existing products. The market share of Company X with respect to product family X is relatively low, namely about x-x.5% Region X broad. Further, the price elasticity of product family X is hard to determine, because Product X.2 is most of all an Engineer To Order product. This means that each product

has different features and is unique. The rest of Product X.2 products are Assemble To Order. This is also hard to determine, but ATO is a bit easier to determine. For Product X.1 most of the products are also ETO, but the proportion of ATO is higher. However, in future Company X wants to shift the products more to ETO. So the price elasticity of these products is hard to determine.

The current value position of Company X is unclear. Several opinions within the company pointed out that there is no clear vision of which position Company X has to take according to the triangle of Treacy and Wiersema (1993). Also concluding from these opinions, Company X has to follow a 'Customer Intimacy' strategy according to the triangle.

The current pricing strategy Company X follows is quite reactive and not active. Prices are set afterwards and not determined in advance. The strategy Company X wants to follow is more value-based. This means that Company X adjust their price to what the customers want. For setting the price Company X wants to use the principle of the Total Economic Value (TEV). This method uses the following formula to calculate the final market price:

$$\text{Total Economic Value} = \text{Reference Value} + \text{Differentiation Value}$$

From this formula, a new one is derived for Company X. This is the following formula:

$$\text{Final market price} = \text{List price} * (0.735 + \text{Differentiation value})$$

Where the Reference Value is a list price set by Company X itself. In around 10% of the cases the Reference Value is also known as the highest offering of the closest competitor. However, that will only be used as a check. So, the Reference Value is equal to a list price which is adjusted by 0.735. This correction factor can be influenced by the Differentiation Value. This DV can be positive or negative and is determined by the variables investigated in this research.

When knowing the pricing strategy, pricing method, value position and market position, the variables are defined. These variables are all of the possible core variables. The core variables, which will be selected, are discussed in the next section. In Table 7 the variables are shown in random order.

Variables	
Sales process	Reputation
Position	Organizational capabilities
Country	Segment
Competitors	DMU's
Exactness	Customer relationship
Flexibility	Volume
Lead time	Specification
Sales channel	

Table 7 List of variables.



## 4. Results

In this section, we describe the results of this research. First, we select the core variables from the list of Section 3.2 by using opinions of employees of Company X; the theories and the position of Company X. Furthermore, we use some quantitative win/loss analyses as extra reason. Subsequently, we determine the weight and score per variable. When this is all determined, we can identify the systematic approach for Company X. Therefore, we try to find an answer to the following sub questions:

- *What are the core variables which have impact on the price setting for the future model?*
- *What is the relation per variable to a won or lost order?*
- *What is the impact per variable on the final market price?*
- *What is the range of values per variable?*

### 4.1. Selection of variables

So, in this sub-section we reduce the list of Table 7 to the core variables. The selection of these core variables is based on several aspects. First, it is based on the value-based pricing strategy Company X wants to pursue. Secondly, the value position of Treacy & Wiersema (1993) plays a role in determining the core variables. Next to that, interviews held during the research also form a basis for determining the core variables. Moreover, win/loss analyses are made on closed Product X.1 and X.2 orders to investigate if the assumptions are valid with the data. We describe and explain the core variables in random order. Before, it has to be noted that the data used for the win/loss analyses do not have a high degree of reliability. This is caused by inconsistency of employees when filling in the data. However, the data give a reasonable view of the reality. For both Product X.1 and X.2, the data are about the last two years, 2015 and 2016. For Product X.1 the total number of orders is 467 and for Product X.2 it is 258.

#### 4.1.1. Position

The first core variable we select is 'position'. As mentioned in Section 3.2, position means a certain premium price based on eco-friendly solutions and products and slightly services of good quality. Together with the customer intimacy strategy Company X has to pursue, this is an important variable. Some opinions underline this statement.

*"Company X says that they have to use a premium price in comparison with their main competitors, which are more focused on a cost leader strategy. This premium is based on Ecofriendly products and quality of the product." (lines, 2016).*

*"Because Company X has to follow a customer intimacy strategy, with this strategy they have to use their position as added value in comparison with their competitors." (Manager S. P., 2016).*

*"The reputation of Company X concerning the quality of their products is good. Company X can use this as a premium in advance of other companies." (Development, 2016).*

*"Company X has products of good quality, they can use product differentiation as competitive advantage. According to Porter, this creates a customer perception that Company X's product is superior to that of other firms , based on brand, quality and performance, so that a premium price can be charged to customers" (Manager S. , 2016).*

*“When having a well-known and accepted brand name, you can set your price higher. Also eco-friendly solutions can cause a higher price, because customer can appreciate ecology.” (Regions, 2016).*

Therefore, position ensures a premium price in advance of the competitors of Company X. Based on these interviews, we can conclude that position is an important criterion to take into account when determining the price. The weight of position is not taken into account, because position always causes a positive influence on the price. Otherwise it will give a distorted view of reality. On the other hand, we just determine the possible scores of position in Section 4.3.

#### **4.1.2. Country**

Secondly, we select ‘country’ as core variable. Currently, this is the only variable the multiplier is based on. These multipliers are set each year, but are quite static. Country plays an important role in the price setting, because each country or region has different financial situations and purchasing power. So, this variable is quite history-based, but also an important factor in setting the ‘right’ price. We can underline the importance of country by the following opinions.

*“Currently it is only based on country, but this is not fact-based. Country is a variable which partly determines the right price, but then it has to be more fact-based. Margins in countries as Sweden and Netherlands will probably be better than in Eastern Europe, so country must be a differentiator in the price setting.” (lines, 2016).*

*“Country causes a certain influence on setting the price. I can imagine that in other countries than the Netherlands prices will be lower most of the time.” (Manager, 2016).*

*“There has to be a relationship between country and the final market price. There are certain countries for Product X.1 and X.2, where the margins have to be higher. So, country must have a certain impact on setting the right price.” (Manager R. M., 2016).*

*“Country is a factor for determining the price. For example, in Eastern Europe the prices are low. Meanwhile, in Scandinavia and Western Europe the price are much higher and in the Middle East it is very different. In Africa it is impossible for Company X to compete on price. Certainly, the country of a project has an impact on the price setting.” (Development, 2016).*

*“The level of life in a country has influence on the price. For example the purchasing power of a country. A higher purchasing power means higher prices. (Regions, 2016).*

In addition, we make some win/loss analyses to quantify the relation between countries and won or lost orders. In Figure 11, we prove that countries are related to won or lost orders. Both Product X.1 and X.2 figures are based on the total number of orders and revenues. In these figures, not every country is taken into account, because there is a lack of data. However, it shows enough to state that country is a differentiator according to pricing, because each country has a different purchasing power or investment possibilities.



---- Confidential ----

Figure 11 Win/loss countries Product X.1 and X.2 (Company X, 2016b) (Company X, 2016a).

#### 4.1.3. Customer relationship

Thirdly, we select 'customer relationship' as core variable. As mentioned in Section 3.1, Company X has to pursue the customer intimacy strategy. This strategy states that loyal customers are an important aspect. A good customer relationship can raise the probability of having loyal customers. Furthermore, the value-based pricing strategy is based on what the customer wants. With a good relationship, the needs of the customer can be identified better. After that, some opinions also state that customer relationship is an important criterion of setting the price.

*"It is important that the customer knows as many people from Company X as possible. Customer relationship plays an important role in obtaining the order."* (Manager S. , Interview pricing, 2016).

*"A good relationship with the customer is important, because the feedback of that customer will also be better. With this feedback you can determine better what is most important for the customer."* (Manager C. E., 2016).

*"Customers expect some competence of the sales engineers. A good customer relationship can influence this positively. "* (Regions, 2016).

*"It is important that the customer wants Company X and not one of their competitors. A good customer relationship contributes to this goal."* (Manager, 2016).

*"Experience with the customer is important for winning the order and setting the price. Further, relationship with the customer has to be good for increasing the chance of winning a project."* (Representative, 2016).

In addition, we also did some win/loss analyses to validate this variable quantitatively. According to Figure 12, we see that customer relationship plays a particular role in winning or losing an order. Looking at the lost orders, mainly price is given as reason. In these cases most of all this is true, but sometimes sales people unfairly give price as reason of losing an order. Overall, we can see in these figures that customer relationship is linked to winning or losing an order. The results are based on the total number of orders.

---- Confidential ----

Figure 12 Reasons won and lost orders Product X.1 and X.2 (Company X, 2016b) (Company X, 2016a).

#### 4.1.4. Volume

Subsequently, we determine 'volume' as the fourth core variable. As mentioned above, volume is about the size of a contract or project. Volume is an important criterion, because there are differences in price level within the volume of an order. Some opinions secure that volume is one of the core variables.

*“When setting the price, the size of an opportunity has to be taken into account. There is a difference in projects and contracts. There is also a difference within the project between small and large ones.” (Manager S. P., 2016).*

*“Size is an important factor in the price setting. It is necessary to know if Company X has to compete for the larger projects or focus on the small ones on the market. Moreover, it is also important if it is a project or a contract.” (lines, 2016).*

*“Company X often loses in the large projects, because these are too much focused on price. Size is an important factor of winning or losing the order. Finding the sweet spot according to size is important for setting the right price.” (Manager, 2016).*

*“The larger the volume is, the more it is about low prices. Projects with lower volume is more focused on added value and customer solution, so prices are higher in that level of volume. Volume has a certain impact on the price.” (Development, 2016).*

First, we have to make a distinction between projects and contracts. A contract is also known as a tender, which means a contract for several years. On the other side, a project is a onetime order. Most of the time, contracts are orders in the utility segment and projects in the private segments.

For the projects, we make scales of volume to identify differences between small, medium and large projects. We see the scales of volume in Table 8. For the contracts, we make a dichotomy between short and long contracts. This dichotomy is also shown in Table 8.

Scale	Volume range
Small project	0-20000 (\$)
Medium project	20000-50000 (\$)
Large project	>50000 (\$)
Short contract	1-2 years
Long contract	More than 2 years

**Table 8 Scales of volume.**

Subsequently, we made a win/loss analysis regarding to the projects. The results of this analysis are shown in Figure 13. We can see that small projects have the highest win percentage regarding Product X.2. For Product X.1 small and medium projects have approximately the same win percentage.

**---- Confidential-----**

**Figure 13 Volumes of Product X.1 and X.2 (Company X, 2016b) (Company X, 2016a)**

Next, we have to identify the difference within the contracts. Due to the fact of absent data regarding to contracts, we observe the difference on the basis of interviews. Below, we show some statements from several interviews held during the research.

*“When you are in for a contract or tender, you have to compete on price. In this case, Company X has a disadvantage, because competitors often offer lower prices. So the longer the contract, the lower the price.” (Development, 2016).*

*When Company X is in for a contract or tender, they often lose. This is because Company X cannot compete on price, due to their premium pricing strategy. (Manager, 2016).*

*“Tenders or contracts with utilities often are for several years. This means a large volume and a low price level. A low price level means more competition for Company X, which is not appreciated.” (Manager S. , Interview pricing, 2016).*

#### **4.1.5. Segment**

Next, we determine ‘segment’ as the fifth core variable. As mentioned in Section 3.2, we can identify several segments within the markets Company X is acting on. Each segment has different price levels. We validate this criterion with the following statements:

*“Each segment has different price categories and multipliers, but at the moment it is not quantified. Some segments have more potential or market share.” (Development, 2016).*

*“Some segments want a certain level of quality of the products. They believe products or systems from Western Europe have more quality.” (Manager S. P., 2016).*

*“There is a difference between the segments according to hit-rates, price levels etc. In some segments the prices have fallen the last years and in some segments the markets are emerging.” (Manager R. M., 2016).*

*“In my segments the price levels and hit-rate differ from other segments. So, you can say that segment is a differentiator in determining the final market price.” (Manager S. , Interview pricing, 2016).*

*“Segments can play a part i.e. a higher price can be realized in private segments as opposed to the public segments, where price is the first consideration.” (Africa, 2016).*

Further, there are some data available about segments, but these data have a very low level of reliability. This is because of the fact that it is not mandatory to fill in which segment the project belongs to. When using these data, it can give a distorted view of the reality. But based on the statements above, we can conclude that segment is one of the core variables in the price setting.

#### **4.1.6. Sales process**

The sixth core variable we select is ‘sales process’. As mentioned in Section 3.2, we identify four stages in the sales process. Every stage causes a certain influence on the hit-rate and final market price. This criterion is important with respect to the customer intimacy strategy. The best customer solution is important within this strategy. When entering early as possible in the process, the chance of deliver this best customer solution will rise. Further, we stated that Company X has to pursue a value-based pricing strategy. This strategy is based on what the customer wants and is willing to pay. When entering as early as possible, the needs of the customer can be learned. In that case, Company X can influence the price by teaching the customer their solution. Moreover, we validate the choice of this variable by some opinions.

*“It is important to be involved early in the sales process, because then Company X can ‘teach’ the customer their solutions. This is also known as ‘spec selling’.” (Manager S. , Interview pricing, 2016).*

*"It is important to know what the customer wants when following a value-based pricing strategy. This can be achieved by entering the sales process early as possible." (Manager S. P., 2016).*

*"Early as possible entering in the sales process is important for getting a better price. The moment of customer contact is a very important criterion in setting the price." (Manager P. , 2016).*

*"There are several steps in the sales process. It is Company X's task to enter as early as possible in the process. First the customer has only an idea, when Company X enters in that stage they can teach the customer their solution." (Manager R. M., 2016).*

*"Currently, the most important aspect of selling product is to know what the customer wants. Entering the sales process in the earliest stage gives Company X the chance to teach the customer their solution." (lines, 2016).*

*"Company X wants to know the specifications of the customer before competitors know. Entering the sales process as early as possible will influence the chance of knowing these specifications positively." (Manager, 2016).*

Subsequently, the data available of the sales stages are not valid. Sales people do not fill in this correctly, because they have to spend their time in selling and not in filling in data (Manager S. , Interview pricing, 2016). Due to this fact, we did not take the data into account within this analysis.

#### **4.1.7. Competitors**

The last core variable we select is 'competitors'. This means the number of competitors when trying to obtain an order. According to several opinions we observe that the number of competitors has a significant influence on the price. There are no data available for this variable.

*"The number of competitors in the market has influence on the price. A high number of competitors in the market cause a lower price." (Regions, 2016).*

*"The prices of competitors influence the price of Company X. More competitors will cause a lower price. Therefore, knowing the number of competitors is important when setting the price." (Africa, 2016).*

*"When trying to obtain an order, it is important to know who your competitors are. When knowing as much as possible about the competitors, Company X can do their price setting better. This will probably increase the hit-rate." (Manager, 2016).*

*"As a company you have to collect as much as possible information about your competitors. Therefore, the number of competitors is the most important. Then Company X can set their market price in a better way." (Representative, 2016).*

*"When you do not know what competitors are offering and how many competitors there are, your position according to your price level is not very well. Company X has to collect as much as possible knowledge and information of the market." (Manager S. , Interview pricing, 2016).*

#### 4.1.8. Rejected variables

We have determined the core variables, therefore the other variables are rejected. This does not mean that they are not important. We list the rejected variables with their main reason for rejection in Table 9.

Variable	Reason
Reputation	It is a consequence from customer relationship and position.
Flexibility	It is hard to measure and define, but important to look at in the future.
Lead time	This is a minimum requirement which Company X must meet. Otherwise, the chance of winning the order is minimal.
Specification	This is a minimum requirement which Company X must meet. Otherwise, the chance of winning the order is minimal.
DMU's	This is a consequence of the variable 'Sales process'. When entering more early, the DMU's are known earlier.
Exactness	This is a variable which is more a consequence of sales process. When entering earlier in the sales process, the price can be estimated more exact.
Organizational capabilities	This is a lagging variable of country. The country determines the maturity and capabilities of that country.
Sales channel	This variable is not essential in the price setting. Moreover, it is a lagging variable of sales process and customer relationship.

Table 9 Rejected variables.

#### 4.2. Weight per variable

In this subsection we discuss the weight per variable selected in Subsection 4.1. These weights are determined by using the Analytical Hierarchy Process. We use the scale of Table 4 to determine interrelated proportions of the criteria. For retrieving results, we conduct a survey among sales employees of Company X.

Within this survey, we do not take position and country into account, because position always causes a positive impact on the price. Country is not taken into account, because most of the projects are local sales and that will probably cause a marginal weight for country. The number of respondents of the survey is 25. We asked the respondents to fill in the proportions between the other five variables with respect to the AHP. In Figure 14, we can see the tool that is used.

Price impact criteria					
	More important	Equal (=9)	More important		Score
Competitors	◀	☐☐☐	▶	Segment	9
Competitors	◀	☐☐☐	▶	Sales process	9
Competitors	◀	☐☐☐	▶	Volume	9
Competitors	◀	☐☐☐	▶	Customer relationship	9
Segment	◀	☐☐☐	▶	Sales process	9
Segment	◀	☐☐☐	▶	Volume	9
Segment	◀	☐☐☐	▶	Customer relationship	9
Sales process	◀	☐☐☐	▶	Volume	9
Sales process	◀	☐☐☐	▶	Customer relationship	9
Volume	◀	☐☐☐	▶	Customer relationship	9

Figure 14 Tool survey criteria.

The scores on the right side are used to calculate the matrix A. We use the average of each score per row to calculate the entries in matrix A. If the average value is below or equal to 9, the value of the entry on the right side is equal to 10 minus the average value of that score. If the average value is greater than 9, the value of the right side is 1 divided by the average value minus 8. Further, we rounded the value to three decimals. From that, we observe the following matrix A:

$$A = \begin{bmatrix} 1 & 2.960 & 0.581 & 1.240 & 0.298 \\ 0.338 & 1 & 0.248 & 0.595 & 0.207 \\ 1.720 & 3.958 & 1 & 2.560 & 0.581 \\ 0.806 & 1.917 & 0.421 & 1 & 0.893 \\ 3.360 & 4.840 & 1.720 & 1.120 & 1 \end{bmatrix}$$

Where the first row and column represent the variable competitor, the second represents segment, the third sales process, the fourth volume and the last customer relationship.

From this matrix A, we have to compute matrix  $A_{norm}$  to obtain the weights per variable. We compute this matrix by using the two-step procedure from Section 2.4. First we divide for each of the columns the entries of column i by the sum of column i. This gives us the following matrix  $A_{norm}$ :

$$A_{norm} = \begin{bmatrix} 0.138 & 0.204 & 0.148 & 0.190 & 0.100 \\ 0.047 & 0.069 & 0.063 & 0.091 & 0.069 \\ 0.238 & 0.278 & 0.254 & 0.393 & 0.195 \\ 0.112 & 0.116 & 0.099 & 0.153 & 0.300 \\ 0.465 & 0.333 & 0.437 & 0.172 & 0.336 \end{bmatrix}$$

From this matrix, we create a column vector  $\mathbf{w}$  which shows us the weights per variable. We compute column vector  $\mathbf{w}$  by calculating the average of each of the rows from matrix  $A_{norm}$ . This gives us the following column vector  $\mathbf{w}$ :

$$\mathbf{w} = \begin{bmatrix} 0.156 \\ 0.068 \\ 0.272 \\ 0.156 \\ 0.349 \end{bmatrix}$$

This vector shows us the weights per variable rounded by three decimals. Moreover, we visualized the weights per variable in a bar chart. We can see this in Figure 15.

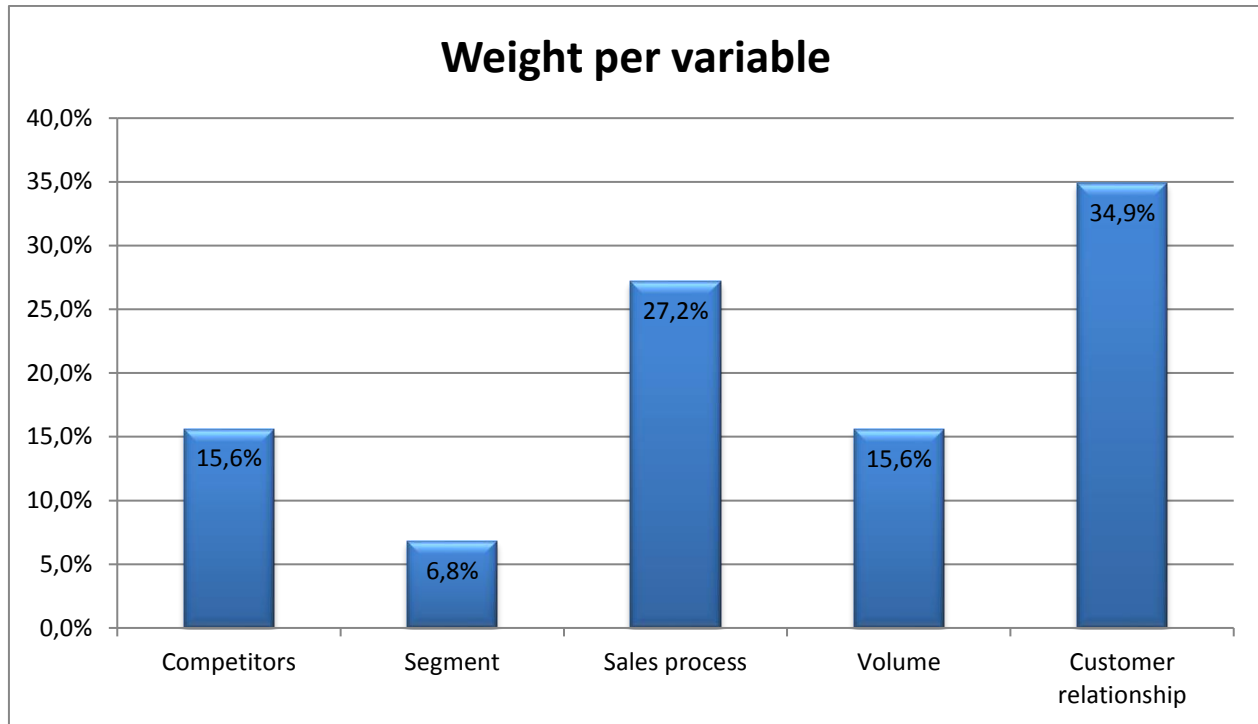


Figure 15 Weights per variable.

After we computed the weights per variable, we have to check the consistency of the comparison's filled in by the respondents. We use the four-step procedure from Section 2.4. First we have to compute  $Aw^T$ . This gives us the following column vector:

$$Aw^T = \begin{bmatrix} 0.812 \\ 0.353 \\ 1.416 \\ 0.813 \\ 1.843 \end{bmatrix}$$

Next, we compute  $\frac{1}{n} \sum_{i=1}^n \frac{\text{ith entry in } Aw^T}{\text{ith entry in } w^T}$ , which we use to calculate the Consistency Index. The result of Step 2 is 5.223. Now, we compute the CI as follows:

$$\text{Consistency Index} = \frac{(\text{Step 2 result}) - n}{n-1} = \frac{5.223-5}{4} = \frac{0.223}{4} = 0.056$$

Now we compare this CI with the Random Index. Because of the number of variables used in this AHP is equal to 5, we use  $RI = 1.12$  with respect to Table 5. So the result of  $\frac{CI}{RI}$  is equal to  $\frac{0.056}{1.12} = 0.050$ .

### 4.3. Score per variable

Here, we determine the score per variable. After that, we can extend it to a model for determining the Differentiation Value. With this DV, we can compute the final market price. The determination of these scores is based on both quantitative and qualitative data. Per variable we explain the approach for determining the score. In these scores Product X.1 and X.2 are taken as one product, because they have shown almost similar relations with win and lost orders. Furthermore, the scores have a wide range, because the total range of the correction factor added by the DV is [0.47; 1.00].

#### 4.3.1. Position

First, we create a range of values for position. As mentioned, this variable always has a positive impact on the price. We observed that Ecofriendly is the most important aspect of this position. So, we create a score range for position on the basis of so called Climate Change Performance Index (CCPI) (Burck et al., 2016). This index is a derivative from the climate top in Paris in 2016. It contains how countries are ranked with respect to climate. The CCPI consists of the following aspects: Emissions level, Development of emissions, Renewable energies, Efficiency and Climate policy (Burck et al., 2016). Because Ecofriendly does not link up with all these aspects, we chose the aspect that matches the best with Ecofriendly. This best match is climate policy, because emissions, renewable energies and efficiency are not related with Ecofriendly.

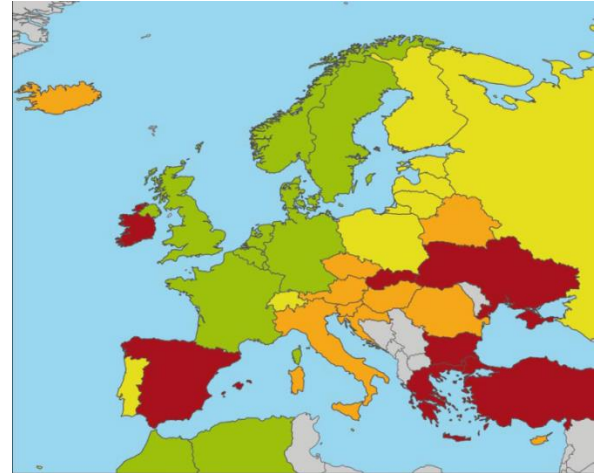


Figure 16 Climate policy Europe (Burck et al., 2016).

Climate policy is related with Ecofriendly, because a climate policy indicates something about eco-friendliness. In Figure 16 we can see the differences between the countries based on the legend of CCPI in Europe. Based on this legend, we create a score range based on a 5 point scale. Dark green is very good; green is good, yellow moderate, orange poor and red very poor (Burck et al., 2016). A map of the world is shown in Appendix C.

As we can see, they use five scales for classifying the countries. We take over this classification for determining the score for position. The key countries which do not have a score according to the CCPI are treated as the lowest class. With this information we create the scores for the variable position per key country according to Company X's strategy plan (Company X, 2015b). We list these scores for position in Table 10.

Position	Score	Countries
Very good	+0.07	None
Good	+0.05	Netherlands, Belgium, France, Germany, Denmark, Norway, Sweden, Denmark, United Kingdom
Moderate	+0.03	Switzerland, Finland, Russia, Poland, South Africa
Poor	+0.01	Austria, Italy, Romania, Czech republic
Very poor/not included	+0.00	Ireland, Saudi Arabia, Oman, United Arab Emirates, Qatar

Table 10 Scores per position (Burck et al., 2016).



#### 4.3.2. Country

Next, we determine the value range of the second variable, country. As mentioned, currently the multiplier is only based on country. There is a list of multipliers, but this list is based on personal feelings and not on theoretical sources. We create a score range per country based on several sources. First, the purchasing power per country is taken into account. Further, we conduct a survey for ranking the countries from 1 to 22. At last, we do a benchmark of price levels in other divisions per country and also rank these countries. Moreover, we only look at the key countries of Company X with respect to the strategy plan. (Company X, 2015b).

First, we look at the purchasing power per country. The definition of purchasing power is as follows: "Purchasing power is the value of a currency expressed in terms of the amount of goods or services that one unit of money can buy. Purchasing power is important because, all else being equal, inflation decreases the amount of goods or services you would be able to purchase." (Investopedia, 2016). We use this as another input for determining the score per country. The purchasing power per country used in this calculation is the one of 2015 (The World Bank, 2016). In Table 11, we can see the purchasing power per country ranked from 1 to 22.

Moreover, we conducted a survey under key account managers and business development managers. This survey contains a list of key countries according to Company X's strategy plan. The respondents could fill in the rank of these key countries from 1 to 5. Hereby, rank 1 means the highest price level and rank 5 the lowest. The number of respondents of this survey was 11. From the rankings filled in by these respondents, the average rank per country is calculated. Finally, we rank the countries from 1 to 22 based on this average rank. The results are shown in Table 11.

At last, we did a benchmark in the other divisions of Company X. In this benchmark we also scored the countries from 1 to 5. For Qatar data were lacking, but in that case we chose the rate which belongs to the Middle East. We can see the results of this benchmark in the column Benchmark score in Table 11.

We create the final score to rank the countries from 1 to 22. For the purchasing power, rank 1 gets a 4% plus and rank 2 gets a 3.6% and so forth. For the survey, we also use the steps of 0.4% per rank from 1 to 22. For the benchmark we give rank 1 a plus 5%, rank 2 a plus 2.5% and so forth. We multiply these four values and next we create a new rank from 1 to 22. Subsequently, rank 1 gets a 8% plus, rank 2 a 7.2% and so forth till rank 22 gets a 8% minus. We can see the results in Table 11 in the last two columns.

Country	Purchasing power rank	Rank (survey)	Benchmark score	Final rank	Score per country
Austria	9	9	3	9	+0.016
Belgium	13	6	1	6	+0.040
Czech Republic	17	20	4	18	-0.048
Denmark	4	8	3	8	+0.024
Finland	10	4	1	5	+0.048
France	14	14	2	10	+0.008
Germany	11	10	3	11	+0.000
Ireland	5	11	5	13	-0.008
Italy	15	21	3	14	-0.016
Netherlands	7	1	1	2	+0.072
Norway	2	2	1	1	+0.080
Oman	18	16	5	20	-0.064
Poland	19	18	5	21	-0.072
Qatar	3	12	5	12	+0.000
Romania	21	22	5	22	-0.080
Russia	20	17	4	19	-0.056
Saudi Arabia	16	13	5	17	-0.040
South Africa	22	19	3	16	-0.032
Sweden	6	3	1	4	+0.056
Switzerland	1	7	1	3	+0.064
United Arab Emirates	12	15	5	15	-0.024
United Kingdom	8	5	2	7	+0.032

Table 11 Scores per country.

#### 4.3.3. Customer relationship

Next, we create a value range for customer relationship. As mentioned in Section 4.1.3, two situations could occur. The first situation is when a customer already exists and the second situation is when it is a new customer (lines, 2016). Within these two situations, we also have a dichotomy. We show the possible situations in a flow chart in Figure 17.

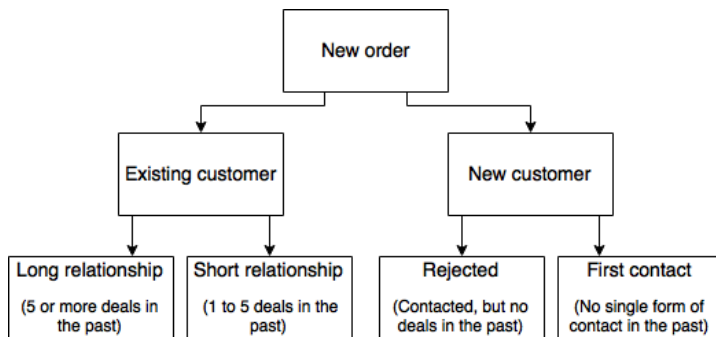


Figure 17 Flow chart customer relationship (lines, 2016).

As we can see in Figure 17, there are four possible situations, therefore there are also four possible scores for the variable customer relationship. The situation with the highest price level is when the relationship exists already for a long time. Most of the time, this means that the customer is loyal to Company X.

According to Treacy & Wiersema (1993), this is an important aspect of the customer intimacy strategy. Therefore, we award this situation with the highest score. Subsequently, a short relationship with the customer is the second highest price level, because an existing relationship is still higher than a new customer. Next, a rejected customer scores relatively negative, because new customers always cause lower prices. However, a rejected customer is a bit moderate, because he maybe had a bad experience with a competitor and now turns to Company X. At last, a first contact causes the lowest price, because the customer is completely new and Company X has to persuade the customer. Unfortunately, there are no data available about price levels per customer, so the scores are based on the customer intimacy strategy. Besides, in Table 12 the scores per situation are shown.

Customer relationship	Score
Long relationship	1.10
Short relationship	1.05
Rejected	0.90
First contact	0.80

Table 12 Score per situation of customer relationship.

#### 4.3.4. Volume

Fourthly, we identify the scores of the variable volume. As mentioned, there are differences in price levels regarding both projects and contracts. First, we show in a flow chart the possible situations. This flowchart is shown in Figure 18.

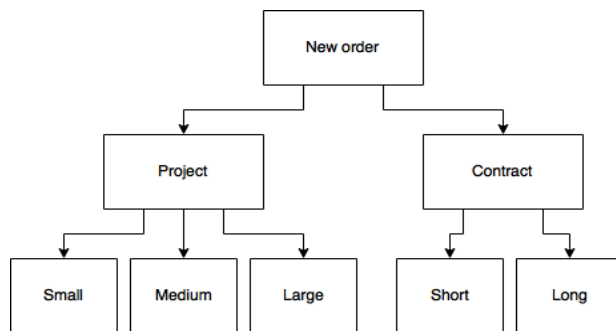


Figure 18 Flowchart volume.

As we can see, there are 5 possible situations in total. The situation with the highest price level is a small project, because of the best hit-rate and the statements in Section 4.1.4. Next to that, the medium projects have the second highest price level. The difference in price level with a small project is quite marginal looking at the hit-rate. After that, we can state that a project with large volume is the third highest according to price level. For utilities the hit-rate is 4% lower than for non-utilities (Company X, 2016b), therefore contracts, which are most of the time utilities, have the lowest price level. As mentioned, the longer the contract is, the lower the price is, therefore long contracts have the lowest price level. The scores that we have determined are shown in Table 13.

Scale of volume	Score
Small	1.100
Medium	1.075
Large	0.950
Short	0.900
Long	0.800

Table 13 Score per scale of volume.

#### 4.3.5. Segment

Next, we create a score range per segment. As mentioned, each segment has different price levels. We determine the score per segment on the basis of a short survey. In this survey, key account managers and business development managers is asked to rank the segments shown in Table 14 from 1 to 10. It has to be noted that the number of respondents is only 12. So the results have a high degree of variation and uncertainty. From the results, we calculate the average rank. From this classification, we derive a score per segment. We set the fifth and sixth as reference point, so they have a score of 0%. The maximum is set at 10%, so the step size is 2.5%. These scores are shown in Table 14.

Segment	Rank	Score
Commercial Buildings	9	0.925
Datacenters	2	1.075
Healthcare	6	1.000
Industries	5	1.000
Infrastructure	4	1.025
Marine & Offshore	3	1.050
Mining	7	0.975
Oil & gas	1	1.100
Universities	8	0.950
Utilities	10	0.900

Table 14 Segment rank and score.

#### 4.3.6. Sales process

Subsequently, we have to create a score range for sales process. As mentioned, the sales process contains 4 stages (CEB Global, 2016). Within the pricing tool of Company X there are 7 stages of a sales process. Because the pricing model developed, is only usable for Company X, we use the stages of Company X for determining a score range. However, we combine the theory and Company X's tool. We classify the 7 stages into the four stages mentioned in Section 3.2. The classification is shown in Table 15.

Sales stage of Company X	Sales stage according to (CEB Global, 2016)
Discover needs	Learn
Qualify opportunity	Define needs
Develop offering	Define needs
Present offering/quote	Assess options
Gain commitment	Assess options
Close deal	Make decision
Deliver solution	Make decision

Table 15 Sales stages classification.

In Table 16 we can see the score per sales stage. As mentioned in Section 4.1.6 entering the sales process as early as possible is important. Therefore, we award stage 1 with the highest price level. Stage 2 gets the second highest price level and so forth until the last stage.

Sales stage	Score
Discover needs	1.150
Qualify opportunity	1.075
Develop offering	1.000
Present offering/quote	0.950
Gain commitment	0.900
Close deal	0.850
Deliver solution	0.800

Table 16 Score per sales stage.

#### 4.3.7. Competitors

As last, we determine the score for the variable of competitors. For this variable, we create a scale related to the number of competitors based on the statements from the interviews held during this research. As mentioned in Subsection 4.1.7, the higher the number of competitors is, the lower the price is. So, the highest score correlates with the lowest number of competitors and the higher the number of competitors is, the lower the price. In the middle, when the customer can choose out of three options the influence on the price is approximately zero, because then the risk is most optimal spread. The scores per number of competitors are shown in Table 17.

Number of competitors	Score
0	1.100
1	1.050
2	1.000
3-4	0.925
5 or more	0.850

Table 17 Score per number of competitors.

#### 4.4. Model

In this subsection, we create a model for calculating the Differentiation Value of the derived formula mentioned in Section 3.1.3. The model we create is quite simple. It is based on the core variables with their possible scores and weights. When the market price is already known, Company X can use this as a final check, but the model can be seen as general. The model is as follows:

$$\text{Differentiation Value} = S_1 + S_2 - (1 - (W_3 * S_3 + W_4 * S_4 + W_5 * S_5 + W_6 * S_6 + W_7 * S_7))$$

We have the following variables within the model:

$S_1$  = Score for position [0.00; 0.07]

$S_2$  = Score for country [-0.08; 0.08]

$S_3$  = Score for customer relationship [0.80; 1.10]

$S_4$  = Score for volume [0.80; 1.10]

$S_5$  = Score for segment [0.90; 1.10]

$S_6$  = Score for sales process [0.80; 1.15]

$S_7$  = Score for competitors [0.850; 1.10]  
 $W_3$  = Weight for customer relationship = 0.349  
 $W_4$  = Weight for volume = 0.156  
 $W_5$  = Weight for segment = 0.068  
 $W_6$  = Weight for sales process = 0.272  
 $W_7$  = Weight for competitors = 0.156

As mentioned earlier, the range of the correction factor multiplied by the DV is [0.47; 1.00]. So, this model is also based on that range. These values are applicable to both Product X.1 and X.2. When the DV is close to the minimum value, we have a slightly complex situation. This is because of the low margin Company X will get when the multiplier is low. Normally, Company X has a standard profit between 30 and 40%. When the multiplier is too low, this standard profit can never be realized. However, the standard profit does not always have to be realized, because extra projects which are not in Company X's profit plan for next year causes a better manufacturing profit. This manufacturing profit means that the factory absorption is more covered and the contribution margin will be higher. So, a negative customer relationship and sales process does not always have to be negative, because Company X has to consider if it can be positive for the manufacturing profit. When it is positive, Company X has to stay in the process. Otherwise, they have to abandon the sales process.

Next, we show an example of the model. We randomly pick some possible scores. For example, the country is Sweden, it is the first contact and it is a large project in the marine & offshore segment entering in stage three with 3 competitors. This gives us the following calculation:

$$\text{Differentiation value} = 0.05 + 0.056 - (1 - (0.349 * 0.800 + 0.156 * 0.950 + 0.068 * 1.050 + 0.272 * 1.000 + 0.156 * 0.925)) = 0.106 - 0.086 = 0.020$$

Assuming that the list price for a standard Product X.1 block is 8720 (Company X, 2016), the calculation of the final market price for this block is as follows:

$$\text{Final market price} = 8720 * (0.735 + 0.020) = 8720 * 0.755 = \text{€ } 6586$$

## 4.5. Conclusion

After this section, we can answer the last remaining sub questions. First, the variables are selected in this section with their relationships to win and lost orders. We select the following criteria with their relationships to won and lost orders in Table 18 below.

Variable	Relationship
Position	There is not relationship with won or lost orders.
Country	From the data available, it can be concluded that each country has their own price level.
Customer relationship	This is often given as reason for winning an order. In terms of lost orders this is significantly less.
Volume	A lower volume causes a higher hit-rate and vice versa.
Segment	Some segments have higher hit-rates, but it is not quantifiable.
Sales process	Based on opinions, entering the sales process as early as possible causes a higher hit-rate.

<b>Competitors</b>	The lower the number of competitors, the higher the chance of winning the order.
--------------------	--

**Table 18** Core variables with their relationships.

From these selected core variables, we have determined the weight per core variable. We do not take position and country into account, because most of the time sales are local and position always causes a positive or neutral influence on the price. We obtain these weights by using the Analytical Hierarchy Process. The weights per variable are as follows:

- Customer relationship → 0.349
- Volume → 0.156
- Segment → 0.068
- Sales process → 0.272
- Competitors → 0.156

We can see that customer relationship has the largest impact of these variables, after that, sales process has a significant impact. Further, volume and competitors have almost the same weight and segment has a very small impact. Moreover, we checked the consistency of the result with following the four-step procedure from Section 2.4. This shows us that the comparisons filled in are consistent, because the comparison's filled in are consistent when CI/RI is 0.050 which is lower than 0.10. Therefore, we can conclude that the comparison's filled in do not have significant inconsistencies.

Next, we determine the scores per variable. For position, we looked at the climate policy per country. We can see that countries in Northern and Western Europe have a better score than other countries. Secondly, we looked at several inputs for country, from this we created a score for each of the countries. We can see that Norway has the highest score. In the third place, we have determined the scores for customer relationship. We see that a long relationship with existing customers has the highest price level. After that, we determined the scores for volume. Small projects have the highest price level and long contracts the lowest. Next to volume, we ranked the segments. We can see that the segment of Oil and Gas has the highest price level. Subsequently, we determined the scores for sales process. When entering the process in the first stage, the price level is the highest and so forth. For the last variable, we determined the scores with respect to the number of competitors. The lower the number of competitors is, the higher the price.

Now we have determined the weights and scores per variable, we can create the model for calculating the Differentiation Value. As mentioned, position and country only have a score. The model is as follows:

$$\text{Differentiation Value} = S_1 + S_2 - (1 - (W_3 * S_3 + W_4 * S_4 + W_5 * S_5 + W_6 * S_6 + W_7 * S_7))$$

We can use this computed DV in combination with the adjusted list price to obtain the final market price. When the market price is known, it can be used as a check for the final market price.

## 5. Conclusion and recommendations

In this section, we formulate the conclusion of this research. Subsequently, we give some general recommendations for Company X. Moreover, we give several recommendations for further research within Company X. At last, we discuss some aspects of this research.

### 5.1. Conclusion

In this subsection, we formulate an answer for the main research question. The main research question is: *What are the core variables with the largest impact on the price setting of Company X for product family X and how can these variables be used as a systematic approach for active pricing?*

First, the selection of variables is based on literature, interviews and data analysis. We conclude that the following variables have the most impact on the price, based on the customer intimacy strategy (Treacy & Wiersema, 1993) Company X has to pursue, interviews held during the research and the win/loss analyses:

- Position, which means the position of Company X with respect to Ecofriendly products.
- Country, which means the country of the order.
- Customer relationship, which means if there is an existing relationship with the customer or not.
- Volume, which means if it is a project or a contract and within these two the size of a project or contract.
- Segment, which means the segment of the order (Mining, Oil and gas etc.).
- Sales process, which the moment of entering the sales process.
- Competitors, which means the number of competitors.

Next, we conclude that from these variables the impact is different. However, position has not a weight, because it always causes a positive influence. Country is not weighted, because most of the sales are local. Therefore, these two variables only get a score. For the other variables we determine both a weight and score range. We obtained these weights by using the Analytical Hierarchy Process. The weights are as follows:

- Customer relationship → 0.349
- Volume → 0.156
- Segment → 0.068
- Sales process → 0.272
- Competitors → 0.156

So, we can conclude that from the variables which have a weight, customer relationship has the largest impact on the price. Next, sales process has also a significant impact on the multiplier. Volume and competitors have a bit less impact and segment has the lowest impact. Moreover, the results are consistent enough with respect to the Consistency Index. Furthermore, for all of the variables we created a score range with the possible scores. These scores are shown in Figure 19 below. Each order has their own score per variable, so we use these scores to calculate the final Differentiation Value with the following model:

$$\text{Differentiation value} = S_1 + S_2 - (1 - (W_3 * S_3 + W_4 * S_4 + W_5 * S_5 + W_6 * S_6 + W_7 * S_7))$$



Where  $S_1$  and  $S_2$  represents the scores of respectively position and country. The other five weights and variables represent the remaining variables in the following order: customer relationship, volume, segment, sales process and competitors. This model computes the Differentiation Value of the final market price. We calculate this final market price with the following formula:

$$\text{Final market price} = \text{List price} * (0.735 + \text{Differentiation value})$$

Within this formula, the factor (0.735 + DV) is restricted to a certain range. We determine this range based on the deals in the past. We observed that this range should be [0.47; 1.00]. When the market price is already known, this can be used as a second check for the calculated market price. In Section 5.2 we give some recommendations for using the model in the future.

Position	Score	Countries
Very good	+0.07	None
Good	+0.05	Netherlands, Belgium, France, Germany, Denmark, Norway, Sweden, Denmark, United Kingdom
Moderate	+0.03	Switzerland, Finland, Russia, Poland, South Africa
Poor	+0.01	Austria, Italy, Romania, Czech republic,
Very poor/not included	+0.00	Ireland, Saudi Arabia, Oman, United Arab Emirates, Qatar

Country	Score per country
Austria	+0.016
Belgium	+0.040
Czech Republic	-0.048
Denmark	+0.024
Finland	+0.048
France	+0.008
Germany	+0.000
Ireland	-0.008
Italy	-0.016
Netherlands	+0.072
Norway	+0.080
Oman	-0.064
Poland	-0.072
Qatar	+0.000
Romania	-0.080
Russia	-0.056
Saudi Arabia	-0.040
South Africa	-0.032
Sweden	+0.056
Switzerland	+0.064
United Arab Emirates	-0.024
United Kingdom	+0.032

Customer relationship	Score
Long relationship	1.10
Short relationship	1.05
Rejected	0.90
First contact	0.80

Scale of volume	Score
Small	1.100
Medium	1.075
Large	0.950
Short	0.900
Long	0.800

Number of competitors	Score
0	1.100
1	1.050
2	1.000
3-4	0.925
5 or more	0.850

Segment	Score
Commercial Buildings	0.925
Data centers	1.075
Healthcare	1.000
Industries	1.000
Infrastructure	1.025
Marine & Offshore	1.050
Mining	0.975
Oil & gas	1.100
Universities	0.950
Utilities	0.900

Sales stage	Score
Discover needs	1.150
Qualify opportunity	1.075
Develop offering	1.000
Present offering/quote	0.950
Gain commitment	0.900
Close deal	0.850
Deliver solution	0.800

Figure 19 Score table.

## 5.2. Recommendations

In this section, we give some general recommendations regarding the research. We also give some recommendations for further research within Company X. Moreover, we discuss some aspects of the research.

### *General recommendations*

First, we recommend Company X to use this model as a starting point in their way to price more actively. However, this model is completely new for Company X. Therefore, they have to test this model for a certain period before using it definitively. When Company X observes that the model is a representative one, they can decide to use the model. When deciding to use this model for determining their price, Company X should update it continuously. This has to be done, because situations in countries could change over a certain period of time. For example, the climate policies per country are not the same each year. Another example is the purchasing power per country that can change each year. Also in segments the economic situations can change during a year. So, a recommendation for Company X to update the model a certain times per year, when using the model definitively.

Another recommendation for Company X is that they have to choose their strategy for the future. In Section 3.1, we assumed that Company X should pursue a customer intimacy strategy with respect to the triangle of Treacy & Wiersema (1993). Currently, they are quite stuck in the middle of the triangle. So, it is important for Company X to clearly define their strategy, because some variables are related to a certain strategy.

### *Further research*

Secondly, we give several recommendations for further research. In this research we investigated the variables separately from each other. It would be useful for Company X to investigate if there are any correlations between the variables. For example, the correlation between the oil & gas segment and all countries. Furthermore, when Company X decides to use the model, they have to implement it in their pricing tool. It should be investigated how this model has to be implemented in the pricing tool. The integration of this model into the tool has to be done by programming.

Next, in this research we only focused on product family X, but it would be useful to determine if this model is applicable to other products. So, a recommendation for Company X is to figure out the suitability of this model to other products. At last, we made a selection of seven variables for this model, but it can be assumed that there are more than seven variables which can influence the price. Therefore, we recommend Company X to investigate continuously if there are new variables which have to be implemented in the model.

Besides these research-related issues, another point of attention is the organization structure of Company X. Currently, they use a matrix organization, but during this research several people stated that the organization is not optimal. Many people only focus on their department. They have to look at the overall performance of Company X. A solution for this could be changing the organization structure.

### *Discussion*

Thirdly, we discuss some limitations of this research. In this research we used several sources of data. The survey for determining the rank per country and segment had respectively 10 and 12 respondents. This can cause a high degree of variation. Therefore, these results could give a distorted view of reality. Furthermore, the data used in the win/loss analyses do not have a high degree of reliability, because not all sales people of Company X fill in the CRM-program correctly. Therefore, the data used for the win/loss analyses could also give a blurred view. We recommend Company X to do better data tracking in the future. This will create a more founded model and data analyses can be done more accurately.

Moreover, we developed a model based on seven variables. This means that several aspects are not taken into account within this model, while they do have a certain influence on the price. Further, some variables can be split into several categories. For example, sales process can include sales channel next to moment of customer contact. So, the developed model is not optimal, but gives Company X a relative good view on their price setting. Therefore, we recommend Company X to tune this model more accurately. This model is also not optimal, because when the price elasticity of product family X is known, the relevance will decrease to a very low level.

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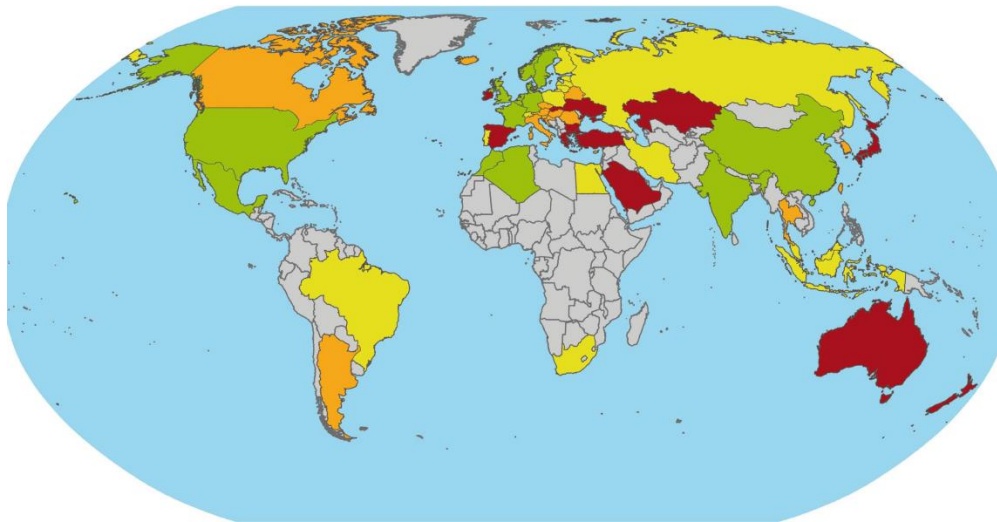
## Appendix A list of problems

---- Confidential -----

## Appendix B Adjusted list price

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## Appendix C World map climate policy



## Appendix D AHP example

We give an example below to show how the AHP works. First we have matrix A:

$$A = \begin{bmatrix} 1 & 3 & 5 \\ 1/3 & 1 & 3 \\ 1/5 & 1/3 & 1 \end{bmatrix}$$

The value chosen from Table 4 are random. From this matrix A, we calculate  $A_{\text{norm}}$  by first dividing the entries of column  $i$  by the sum of column  $i$ . That gives us the following matrix rounded by two decimals:

$$A_{\text{norm}} = \begin{bmatrix} 0.65 & 0.69 & 0.56 \\ 0.22 & 0.23 & 0.33 \\ 0.13 & 0.08 & 0.11 \end{bmatrix}$$

The weights per criterion are determined by calculating the averages of the entries in row  $i$  of  $A_{\text{norm}}$ . That gives us the following weights also rounded by two decimals:

$$\begin{matrix} 0.63 \\ \mathbf{W} = 0.26 \\ 0.11 \end{matrix}$$

Now we have determined the weights, we have to check the consistency. First we compute  $A\mathbf{w}^T$  by multiplying matrix A by column vector  $\mathbf{w}$ . This gives us the following column vector:

$$\begin{matrix} 1.95 \\ A\mathbf{w}^T = 0.79 \\ 0.32 \end{matrix}$$

After that, we compute  $\frac{1}{n} \sum_{i=1}^n \frac{\text{ith entry in } A\mathbf{w}^T}{\text{ith entry in } \mathbf{w}^T} = 3.04$

Step three is to compute the Consistency index with the following formula:

$$\text{Consistency Index} = \frac{(\text{Step 2 result}) - n}{n-1} = 0.02$$

Next we compare the CI with the Random Index which in this case is equal to 0.58, because  $n = 3$ .

So,  $CI/RI = 0.03$ , which is lower than 0.10. This means that the comparisons made are consistent enough to give useful estimates of the weights.

## Appendix E

---- Confidential -----