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DESIGNING A DASHBOARD TO SUPPORT THE DECISION PROCESS OF DYNAMIC PRICING

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Preface

It has been a great journey in the past two years of time at the University of Twente. The university has been a tremendous support to me and given me many opportunities to learn new things every day to take the right direction in my career. Starting with a pre-master's and master's in business information technology and completing my student life with 7 months of thesis work. Having said that, I would like to thank many people who have supported me during my research project.

Firstly, I would like to show gratitude to my graduation committee supervisors, Klaas Sikkel and Fons Wijnhoven for providing me the right guidance and valuable feedback during my thesis. Every meeting was interesting, and we had nice conversations every time which always inspired me to learn new things. I also would like to thank my Etail Genius colleagues for allowing me to write my thesis there. Especially, my supervisors at Etail Genius, Felix Janszen and Arian Oosthoek for excellent guidance and support during this process.

I also wish to thank all the interviewees whose inputs and feedback were vital to the design of the dashboard. I want to acknowledge the contributions of Marcel Cappens, Adger Banken, Maarten Hoksbergen, Robert Lane, Thymen Kristen, Joshua van Beekum for being a part of this empirical study and taking the time to participate in the interviews.

Most importantly, a note of thanks to my family and friends for allowing me to study abroad and for giving me wise counsel during my academic education years.

Management Summary

The wholesalers' market field is changing drastically and constantly evolving due to technological developments, changing demands and customers' wishes. In addition, the position of wholesale companies in the current market field is becoming more challenging. For this reason, many companies test their pricing strategy continuously for relevance and accuracy to compete with others. There are many ways of determining pricing such as on pricing tools (*Omnia*), but these tools are not smart and easily understandable for many of the price decision managers. Therefore, introducing artificial intelligence models and designing dashboards, the situation of price decision making can be improved. This increases the company's profit margin.

Purpose: The goal of this study is to do empirical research on the requirements for a smart dashboard to improve the decision process of dynamic pricing of wholesale companies.

Methodology/ Approach: The main research methods applied were literature reviews and multiple case studies that resulted from semi-structured interviews. Based on that, the design rules were defined, i.e. the decision processes underlying the design of the dashboard. The dashboard was used as a prototype to have concrete feedback from interviewees. To validate the prototype, an extensive evaluation process was conducted with six different experts, which included pricing managers, wholesale directors and business analysts.

Results: From literature study, we abstracted five pricing strategies (Value-based, Competitors-based, Cost-based, Micro-marketing and Algorithmic pricing). In addition, methods (such as Regression and Bayesian), techniques (Machine learning algorithm technique) and approaches (Conservative approach) applied for those strategies have been identified. However, the research on dynamic pricing for wholesale companies is still scarce and specific design rules (decision processes) to wholesale companies are hardly mentioned. The findings of this study implicate that companies want to apply a value-based pricing strategy. Moreover, the interview results show that the main aspects needed for decision-making by wholesale companies and therefore the main drivers of the dashboard are: price elasticity, customer groups, sales, and gross margin. More importantly, it should be simple enough to understand. From these interviews, we also found that each company has a different ways of executing their pricing strategy.

To incorporate literature studies and requirements of the wholesale companies, we defined the

design rules. In order to define the rules and to support the decision process of pricing, we found Balanced Scorecard (BSC) to be a suitable framework. This framework has been used to define the design rules in four perspectives (*Customer, Learning & Growth, Internal Process and Financial*). In addition, the requirements of the dashboard from the interviewed companies are covered in these perspectives. Furthermore, from the five identified pricing strategies, we adopted the value-based pricing strategy and regression methods to calculate price elasticity, revenue and gross margin.

Recommendations: Based on the interviews and an additional literature study, we provide design rules with four perspectives and simple mathematical models, of which the following are of direct value for wholesale companies and can be implemented easily.

- Firstly, group the customers in combination with the relevant products or product groups. This helps to identify the groups who have similar pricing behavior.
- Secondly, learn about how those identified customer groups value, in addition to the various product attributes and/or service(s) in relation to the price. More importantly, identify whether the company is operating in a red ocean or following a blue ocean strategy. "Red ocean" is a situation in which multiple vendors offer essentially the same product and thus mainly compete on price. In a "blue ocean" situation the product is sufficiently different from competitors' products to create an uncontested market space. If the companies are approaching red ocean strategy, then they should convert it to blue ocean strategy. This is because competition between the companies following red ocean strategy, makes them to set their prices as low as possible which results into lowest profit. However, companies can create and capture a new demand by setting their prices high in blue ocean. Furthermore, this way of learning makes it simple to determine the price elasticity and revenue combined with customer group or product group. This shows the optimal price at which revenue will be maximum. In addition, based on these calculations, we identify the key value items (KVIs) which are also called as leading products.
- Thirdly, for additional value services, understand the touchpoints for those customer groups and which actions at these touchpoints are most valued by the customers. For example, discount strategy, delivery time etc.
- Lastly, in the fourth perspective, optimize prices with gross margin and profit margin per distributed channel.

Besides the above-mentioned points, we found three important points which will become important for wholesale companies in the near future.

- Implement the price elasticity with the logistic model instead of linear regression model. This helps to determine the outliers. These outliers are the variables such as promotion price, discount price etc.
- Integrate a designed dashboard within the current business of the company.
- In addition, expand the design of the dashboard to price setting platform to change the suggested optimal price directly in the pricing system.

List of acronyms

KVI	Key Value Items
WTP	Willingness to Pay
BSC	Balanced Scorecard
GMV	Gross merchandise value
KPI	Key Performance Indicators
CMA	Concurrent Marketing Analysis
ABMS	Agent Based Model Simulation
EBDITA	Earnings before interest, taxes, depreciation and amortization

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Chapter 1

Introduction

Price is one of the most important drivers for the gross profit margin of any organization. The current decision making about pricing is usually based on experience and intuition. However, for companies with large assortment (especially for wholesale companies), it is a complex decision to determine which products have to be sold at what price to improve the profit margin. Having said that, since the last few years, many wholesale companies have run into a black box problem¹. It is a situation in which these companies invest heavily in dynamic pricing, but the end users are not able to understand the operation of dynamic pricing tools (such as *Omnia's pricing tool*²), nor the logic behind dynamic pricing itself. This makes pricing managers suspicious of the recommendations. To build this trust in retailers and wholesalers, customized implementation is required where a dynamic-pricing solution should be optimized for use by category managers and pricing managers. The implementation of this technique might result in an increase in a retailer's profit margin, and customer satisfaction through improved price perception on the most competitive items (BenMark et al., 2017).

To mitigate this problem, several managers can tailor the optimal dynamic pricing dashboard module to meet their business objectives and needs. The explosive growth of advanced technologies and methodologies powered by artificial intelligence and big data analytics can help wholesale companies to integrate their pricing decision making process in daily activities. With the right information of price recommendations on the dashboards they can quickly and easily guide managers to find optimal price (Baye et al., 2007).

In the recent past, research has been conducted in this field of study to understand the pricing strategies used by managers. However, the literature does not suggest how the pricing strategies should be combined to determine an optimal pricing schedule (Noble and Gruca, 1999). Therefore, this research aims to provide an optimal dynamic pricing dashboard for wholesale

¹This problem arises when the user does not understand the internal structure of the system.

²Through an intelligent core algorithm and based on price elasticity of products this tool offers dynamic pricing. However, this model is trained only for limited number of products and as model is black box; the underlying principles are not understandable to managers.

companies with an extensive literature review on eliciting requirements of dashboard by interviewing a representative sample of the target group. The detailed explanation of literature review is provided in Chapter 2.

Currently, there are several dashboards and tools on dynamic pricing, for instance, *Price optimization tools*, *Prisync pricing*³ dashboard. However, these tools are not interactive enough for end users to understand and make a pricing decision in a dynamic market. Therefore, this empirical research will be conducted to understand how to design an optimal dashboard that gives advice to pricing managers (retailers and wholesalers), to increase a company's profit margin with better determination of optimal dynamic pricing. In order to obtain the requirements of the dashboard, seven interviews were conducted with six different managers. The additional information on interview set-up and results are described in Chapter 3.

Moreover, these strategies and interview results, are used to design rules and develop a dashboard which represents pricing recommendations to wholesale companies. The design rules are defined by accumulating design about knowledge of users and companies from previous experience which helps to categorize the requirements. In addition, another round of interview was set up with the same managers who were interviewed for this research, to demonstrate and evaluate the dashboard. Lastly, the overall results and recommendations for the future research are proposed to the wholesales companies.

1.1 Problem Identification and Motivation

Although there is existing research in this area, many of them specifically focus on advising price decision making process for retailers, almost none are available for wholesalers. Some research has been conducted about understanding which factors of pricing strategies are important in determining pricing strategies, used by pricing managers (Noble and Gruca, 1999). Besides that, in building relationship with the customers retailers are always at the front line, whereas wholesalers are at least one step behind and relies heavily on market research and feedback. For that reason, wholesalers should leverage all their problems and focus on offering a value-added service to strengthen their long-term relationship with the customers. Since, the technology is relatively new (10 years) and Artificial Intelligence has rapidly developed and will stay here for many years to come, to advance such solutions to the companies. Therefore, this empirical research sets out to analyze and verify the results shown in literature with current practice, extending the reach of the research, and designing the dashboard according to wholesale companies requirements.

³This dashboard is developed only for online shops to track competitors' prices and to monitor their software.

1.2 Research Objective

The objective of this thesis is to design a dashboard that fulfills the requirements of wholesale companies to improve in their price decision-making process which in turn increases their profit margin. For this purpose, current practices, the strategies and the methodologies in Dynamic Pricing are identified from contemporary literature. Furthermore, based on these identified strategies and methods, a series of interviews are conducted with the relevant pricing managers to understand their requirements on the dashboard. Based on the results and findings of the interviews, the design rules are defined which helps the companies in the decision process of pricing. According to defined rules the dashboard is designed and developed in order to evaluate with the same interviewed managers. Depending on the outcome of the evaluation phase, the final design rules are recommended to the companies.

1.3 Research question

For this thesis a set of research questions are framed. The research questions focus on the available literature and focus on the empirical study and design phase. The available research papers on pricing have been identified and summarized and can be found in the Reference Section.

The main research questions result from the research objective which is phrased as follows.

What is a suitable pricing dashboard that helps wholesale companies to improve their decision process of pricing?

In order to design an effective dynamic pricing dashboard and to have desired interaction with the dashboard, it is required to have two or more pricing strategy questions and suitable design related questions. Firstly, it is essential to identify the existing pricing strategies and methods that have been used to find these strategies. Therefore, the first research sub-question is formulated as follows:

1. Which different pricing strategies exist? and which methods, functionalities and techniques are currently available to support these strategies?

Secondly, it is required to understand which of these strategies have been applied in the wholesale companies. In addition, it is very important to know about their pricing features to be included on the dashboard. Understanding these will aid in designing the effective pricing strategy. However, the pricing strategies are expected to differ per company and their respective environment. In order to understand the company's requirements, the second research sub-question is defined as follows:

2. What are the desired pricing strategy objectives of the wholesale companies? and which problems are experienced in full filling these objectives?

A suitable set of design rules for implementing these practices and addressing the identified pricing strategy has to be designed based on the outcome of the above sub-questions. Therefore, the third sub-question will be the knowledge question which is represented as follows:

3. What are the suitable principles to guide the design of a dashboard for proper decision process of pricing and to add value to customer?

In order to design and to represent the dashboard that incorporates the requirements of the interviewees, the fourth design sub-question is expressed as follows:

4. How can these principles be incorporated in a dashboard?

Lastly, to evaluate the dashboard with the interviewees the final sub-question is stated as follows:

5. How well does the design meet the requirements of the wholesale companies?

Research subquestion one and two aims in understanding the background of different pricing strategies while questions three, four and five are designed to represent the company's outcomes.

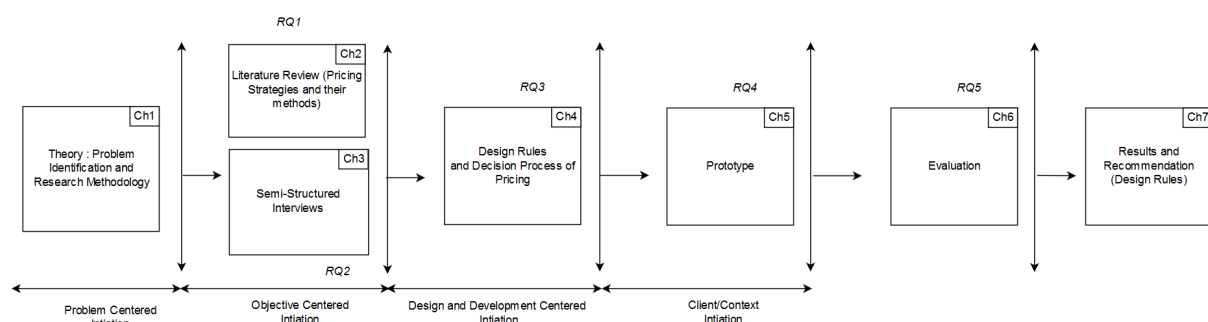


Figure 1.1: Research Model

Figure 1.1 shows the deliverables that result from the research questions in the research model notation of Verschuren et al. (2010). This type of research was selected due to the empirical research concerning the wholesale company requirements and design research in designing dynamic pricing dashboard. In this research model, the approach is linear. The vertically aligned deliverables can be worked out in parallel, while an arrow required the previous deliverables to be done first. The evaluation is done by the same interviewees who were interviewed

in earlier process. The arrows at the bottom of the model indicate the phase of the design research that corresponds to the particular action. The elaborated details of these actions are briefly explained in the next Section 1.4.

1.4 Research Methodology

This section elaborates on the methodologies applied while conducting this research. To ensure that research framework and methodology is carefully and efficiently executed the paper of Peffers DSRM model (Peffers et al., 2007) has been used. This research framework is mainly designed for Information system research in Design Science. In other words, the author (Peffers et al., 2007) defines DSRM model as designing of a software that is reused in the context of a research field and evaluating that software by approaching different companies is treated as a case study.

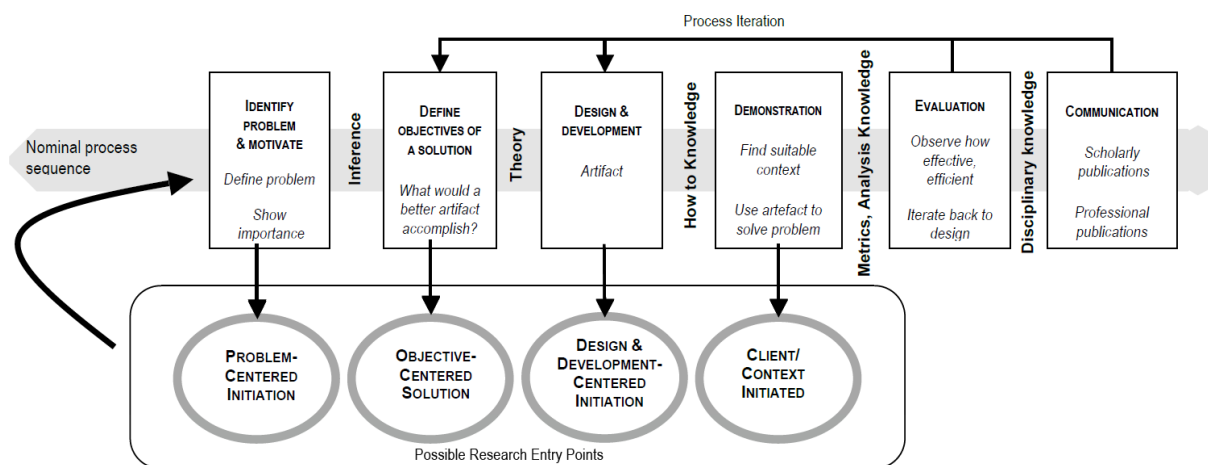


Figure 1.2: Design Research Methodology (DSRM) Model

As shown from the above Figure 1.2, the same steps are followed in this thesis. Firstly, the “Identification of the problem and motivation” is covered in Chapter 1. Secondly, “Defining the objectives of a solution” comprises Chapter 2 (literature study, concepts of pricing strategies) and Chapter 3 (Semi-structured interviews: to obtain the requirements of wholesale companies). Thirdly, “Design and development” is done by defining the “Design rules”, i.e., motivating the use of BSC as an appropriate basis (Chapter 4), and constructing the prototype (Chapter 5). The prototype is “Demonstrated” by showing the prototype to an interview and evaluating it with them. Besides that, the “Evaluation” is a discussion about how well the prototype does its job, what could be improved, etc. Therefore, Chapter 6 briefly explains both demonstration of prototype and evaluation process. Lastly, based on the evaluation results, the usefulness of this dashboard and some key findings for the further development of the dashboard are discussed

(“Communication”) in the Chapter 7.

Moreover, Peffers et al. (2007) represents four cases to demonstrate the design science research project. Among those four cases, this thesis follows the same procedure as first case (i.e. The CATCH Data Warehouse for Health Status Assessments). This is because, it briefly shows how the process of motivating, developing, designing, demonstrating, evaluating, and communicating the artifact is consistent with the DSRM. In addition, it also encompasses the complete conceptual framework. Therefore, this section also provides the brief introduction of each phase of this thesis. The previous Section 1.1 provides the description of problem identification and motivation.

1.4.1 Definition of Objectives of a Solution

Literature Review

The study is conducted to gain more insight in the field of Dynamic Pricing that supports designing of dashboard which involves different pricing strategies. To ensure that the literature review is carefully and efficiently executed, the method of Webster and Watson (2002) has been used.

In the literature review, some relevant scientific literature papers have been provided from the E-tail Genius company and other papers are found using literature databases such as Scopus and Academia. Scopus is consulted to find the relevant scientific literature papers whereas Acedemia.edu is the platform to share research papers and to monitor their impact. In addition, to obtain additional information on pricing, some of the papers have been collected from a professor from Erasmus University, Rotterdam. However, as the research is on Designing an Optimal Dynamic Pricing dashboard for wholesale companies, the number of available scientific literature is rather limited. Search engine Google Scholar is consulted to identify non-scientific literature in support of the previously identified scientific literature.

Examples of non-scientific literature include technical magazine articles and reports. The online articles and seminar information has been obtained by means of snowballing and searching with keywords. The additional information on how the literature review is performed can be found in Appendix A.

Interviews

In addition to the literature review, interviews with several managers and business analysts originating from the field of Dynamic Pricing at wholesale companies are performed. These interviews are highly valuable to obtain information from practice, in order to compare that with the information obtained from the available literature and designing the dashboard according to company's specific requirements. Each of the interviews take up around 20 to 30 minutes, to

prevent theoretical saturation and the interviewee from becoming impatient. In addition, semi-structured open-ended interviews are used. Due to this style, the main line of the interviews is prepared in advance allowing for a framework containing several ‘fixed’ questions. However, the structure allows for flexibility so that there is room for discussions and follow-up questions. Additional information regarding the qualitative interviews and fixed questions can be found in Appendix B.

1.4.2 Design and Development

Design Rules

The pricing strategies and interview results are used to determine design rules and to design a dashboard which represents pricing recommendations to wholesale companies. The Design Rules are defined by accumulating design about the knowledge of users. Besides that, best practices of companies from previous experience that helps to categorize the requirements on Dashboard. In addition, dashboard supports the process of pricing. An extensive framework Balanced ScoreCard Perspectives (BCS) is applied to support the process of pricing in order to formulate the design rules. Firstly, in the customer perspective the customer behaviour has been identified. Based on the customer behaviour, in the second perspective i.e. in learning & growth perspective it is required to learn about those customers. In order to understand about the customers behaviour, it is recommended for a companies to follow a value-based pricing strategy. This can be followed with the conversion of strategy from red ocean to blue ocean. The companies who compete in an existing market space are called as red oceans. Due to competition companies set their prices very low which turns out to lower their profit. However, companies who create an uncontested market space are termed as blue oceans. In this environment the competition is irrelevant so companies can set their prices even for higher amount. This way of learning makes it easier to measure parameters such as elasticity and revenue. Moreover, in the third perspective to add extra value services to the customers touchpoints are defined. At last, in the financial perspective prices are optimized to identify the gross margin and profit margin. The additional information of perspectives is provided in the Appendix C.

1.4.3 Demonstration

Prototype

Based on the design rules and the framework, the dynamic pricing dashboard is designed. This dashboard is used as a prototype to demonstrate and to evaluate with the interviewees. The dashboard is divided into four main pages and one overview page. The pages have been defined with respect to the balanced scorecard perspectives and process of pricing information. The customer perspective is defined in the first page, by segmenting customers based on the quantity and amount they are paying for that quantity. The second page represents the learning and growth perspective. Moreover, in this case price elasticity and revenue plays an important

role to identify the value-added service to the customer groups. Therefore, two simple mathematical models have been defined in this page. The third page shows the internal and growth perspective to understand the customer journey behind the processes. The fourth page reflects the financial perspectives by measuring profit margin per distributed channel and by identifying the optimal price at which gross margin or revenue will be maximum. At last, the overview page represents the summarized calculation of other parameters such as average sales per customer group. The additional information of the steps taken to design the dashboard can be found in Appendix D.

1.4.4 Evaluation

The interviewees from the previous interview have been contacted again to evaluate the dashboard. This evaluation process is highly valuable to obtain the information about the interviewees fulfillment over the dashboard. Each of the evaluation process took up to 30 to 45 minutes to prevent theoretical saturation and interviewee becoming impatient. Due to this style, the main line of evaluation was prepared in advanced with set of fixed questions. In the beginning of the evaluation, the framework behind the dashboard is explained through a presentation and later the demo of the dashboard is shown to each interviewee. In addition, the process allows for flexibility so that there is a room for feedback and improvement in the dashboard. The additional information of fixed questions and responses from each interviewee is provided in Appendix E.

1.4.5 Communication

The research artifacts resulting from this study included a designed and evaluated dynamic pricing dashboard for wholesale companies. The dashboard provides four perspectives combining with the valuable pricing strategy that is useful in decision process of pricing. In addition, this dashboard not only provides valid information but also suggests the optimal price to improve the revenue and gross margin of the company. Besides that, the key findings of the other pricing models to optimize the prices suggests companies on how to further develop it.

1.5 Thesis Structure

To make it easier for the reader to follow this thesis, this section provides the overview of the thesis structure. Chapter 1 covers the introduction of pricing and problems associated with that in a current market. Moreover, it also provides what steps to be taken further to solve those problems. Chapter 2 provides the reader with background information of different pricing strategies. Besides that, semi-structured interviews and the framework for price decision making is provided in Chapter 3 & 4. Demonstration of dashboard and interview results are provided in Chapter 5 & 6. Furthermore, Chapter 7 discusses results and draws conclusions.

Chapter 2

Literature Review

For identifying different modules and strategies of Dynamic Pricing, in total about 14 different articles has been reviewed. These articles ranged from general overviews about the pricing strategies to consumer behavior on the dynamic changes in the market. In recent years, the Dynamic Pricing has received a considerable amount of attention in research area from different scientific communities such as operations research and management science, marketing, economics, econometrics, and computer science. Hence, there are many articles available online related to dynamic pricing, so some of the relevant information is also collected from these articles.

As pricing is a broad research field, so the aspect is mainly focused on value-based pricing approach and on other pricing strategies, because the value-based Pricing is a long-term solution for most of the company's problems. Besides, the field of marketing is also rapidly changing, so the annual frontiers from Erasmus university provides insights into the latest technologies and developments in form of the masterclass sessions. Moreover, these sessions provide the information on different pricing perspectives and its effect on customer behavior. Therefore, the information related to value-based pricing is identified from these seminars, and some of the articles are collected from one of the speakers (also an assistant Professor of Erasmus University, Rotterdam).

Every mentioned aspect is extracted from at least one article. Several pricing strategies were identified of which the most important are based on value-based pricing. First, we start with different pricing strategies and its impact on consumers. Also, a definition of each strategy is giving, to clarify the meaning and concepts. Following which the methodologies and techniques used to implement these strategies are mentioned.

2.1 Pricing Strategies

There are in total 5 main pricing strategies discussed in this research paper.

2.1.1 Value-based pricing strategy

Definition: In a value-based pricing strategy, the prices for a product or service are set according to consumers perceived value.

De Ruyter et al. (1997) claims that value is defined in many terms, firstly it is described in terms of pricing as a trade-off between quality and service. For example, in non-profit sectors like art museums the service delivery plays an important role. Secondly, the value can be regarded as an 'interactive relativistic consumption preference experience', which means in marketing, service process is more important antecedent of customer evaluations than the service outcome. The customer lifetime value has been given an increasing attention in marketing and customers are the most important intangible assets of a firm. Therefore, their value should be measured and managed (Gupta et al., 2004). Moreover, according to Hartman's formal model, the value can be used to measure customer behavior on three-dimension values: Emotional, Practical and Logical.

The value is not only influenced for brick-and-mortar shopping centers but also for social commerce marketplaces (Stephen & Toubia, 2010). These marketplaces are useful to most of the individual sellers to create their own online shops and to network with customers. For a marketplace owner, shifting to a networked marketplace is a revenue-boosting decision. Moreover, this networked structure marketplace is valuable to customers for those who browse for best shops and products.

Price Perception According to Ferecatu (2018) the value-based pricing can be used to improve customers price perception. However, the price perception has different price fairness factors as mentioned below,

- Objective value of the product
- Willingness to pay (WTP) which is influenced by price of substitutes and marketing efforts.
- Product price and Product cost which is influencing the perceived value and pricing strategy

Furthermore, perceived value can be influenced by setting an incentive price. For example, when a company sets an incentive price to sell their product it sets this price below the official product price, so that customers have an incentive to purchase. This strategy captures and creates a value for customers.

Consumer perception can be derived based on Key Value Items. Key Value Items or Leading products are used to estimate how much each product affects consumer perception.

According to BenMark et al. (2017), KVI could be,

- Market basket analytics which will help to identify those key items that lead to more add-on purchases.
- Segmented list that is tailored to specific customer buying behaviors.

The theory behind KVI is that not all products in the assortment are the same in the eyes of the customer. The price and value-perception to one product can be different than for other products. The customer makes his purchasing decision based on these "Key Value Items" and looks at what the "value for money" is. In a supermarket, for example, this is the bread, cheese, cola or beer for a consumer. In a technical wholesaler this can be a PVC tube for an installer.

It is important that the customer purchases, together with the Key Value Items, called leading products, which have a lower price perception. By pricing the Key Value items more attractively, more margin can be earned by selling the "lead products". The strategy is to competitively price these KVI's, so that a higher turnover or gross margin can be achieved on other products.

Similarly, Heinrich et al, (2016) explained how Retailers can improve their price perception profitably by considering some of the below mentioned key terms, to identify KVI's.

- Firstly, to represent a good value for money, identify Stock Keeping Units (SKU's) which have a low per unit price.
- Secondly, identify most price-sensitive customers
- Then, the above identified customers must be assessed in terms of items purchased.
- Lastly, rank the SKU's and the highly ranked SKU's will be the Key-value Items (KVIs).

2.1.2 Competitors-based Pricing

Definition: Competition-based pricing entails a method in which the competitors' prices are used as a basis in setting prices for similar (or the same) products. It is therefore focuses more on the current events in the market rather than the cost of production (cost plus pricing) or the perceived market value (value-based pricing).

When it comes to competitors' pricing or when competitors' are monitoring, it is advised to use the Hit and Run pricing strategy. This strategy can be used to reduce the ability of competitors to both anticipate and respond to a price cut and can generate top line growth of the price, to increase in the profit-margin (Baye et al., 2007).

As price is an important driver for consumers to choose the store and for retailers to decide prices on products, this has led the price competition in retailing. Therefore, the Willart (2015) says that price density function (PDF) can be used as tool to determine the impact on sales. The price density function is used to set the prices in order to capture the number of Stock Keeping Units (SKU's) in a store which in turn offers price per given category of products. Moreover, the comparison of PDF to the PDF of neighbor stores determines the relative price density function (Willart, 2015). In order to focus on high priced products most of the supermarkets are facing hard-discount entry. Hence, the analysis of relative PDF can be used to identify the best strategy for supermarkets, which diminishes comparisons and fosters complementarity between competitors. In addition, the relative PDF allows retailers to be successful in assortment, and pricing decisions. These decisions must incorporate with consumer demand and competitors strategies. This is also an efficient strategy for discounter or for supermarket competition (Willart, 2015).

2.1.3 Cost-based Pricing

Definition: Cost based pricing is used in such a situation in markets, where demand is very difficult to estimate.

Noble & Gruca, (1999) describes that Cost-based Pricing situation is based upon internal costs of the firm. The strategy to consider in this situation is cost-plus pricing. Around thirty years ago, managers used cost-based pricing as their primary pricing because the average unit costs are likely to be constant over time, and at any point on the demand curve. However, this pricing situation ignores consumer and competitive information.

Therefore, Noble et al.(1999) also defined three other pricing situations which are sub-divided into different strategies.

- New product pricing situation will help manager to predict appropriate price at the early life for the product. The strategies which comes under this situation are,
 - Price skimming
 - Penetration pricing
 - Experience curve pricing
- Competitive pricing situation is suitable for mature market which determines the price of the product relative to the price of one or more competitors.
- Product line pricing situation is helpful to the managers in the firm who sell goods and services related to the focal product, which is influenced by other related goods and services from the same company. The managers might choose one of the below strategies when they come under same situation,

- Complementary product pricing
- Price bundling
- Customer value pricing

2.1.4 Micro-marketing Pricing

Definition: Micro marketing is (described as) a form of marketing in which the products or services are targeted directly to the customers.

It is one of the pricing strategies which mainly focuses only on independent neighborhood stores to estimate their demands. According to Montgomery (1997), this strategy helps retailer to focus on everyday price changes that will not alter the current change. At present, most of the retailers practice a very limited form of micro-marketing such as 'zone pricing'¹, to respond to competitive conditions. For example, proximity of a data warehouse and deriving new micro-marketing strategies. In addition, the main advantage of this strategy is that it is profitable and helps to increase the gross profit margin.

For the successful development of micro-marketing strategy, it is very important to understand how the price elasticities vary with market characteristics. Accordingly, the determinants of price elasticity are distinguished based on market characteristics (brand, product category, competition and economic conditions) and research methodology (data and model characteristics). The change in price sensitivity has led the magnitude of price elasticity and absolute (sales) elasticity to increase over time. However, the changes in relative elasticities such as choice and market share remain quite stable (Montgomery, 1997).

The strongest factors that contribute to a change in price elasticity are product life-cycle phase and the interaction effect. When it comes to product life-cycle, Noble & Gruca (1999) defines a New product pricing situation for industrial managers to set an appropriate price at the early life for the product, so that one can change the price according to customers expectation. For instance, in the initial phase of product life-cycle, consumers are more attracted to the benefits of the new product. This leads to decrease in price elasticities. However, in the later stages due to the number of competitive substitutes increases; price-sensitive consumers attract mainly to the cheapest product category which leads to increase in the price elasticities (Montgomery, 1997). This price changes have a great impact on the sales (Noble et al., 1999).

BenMark et al. (2017) illustrated several examples on how the retailers can drive profitable growth through dynamic pricing using an elasticity module. For example, an Asian online re-

¹This type of pricing is mainly implemented to group the stores into clusters and change (decrease or increase) the everyday prices in cluster (Montgomery, 1997)

tailor designed a unique elasticity software module to the retailer's available data pricing strategy dashboard. In this case, an item-level pricing strategy is considered that could optimize for both profit and gross merchandise value (GMV). In addition, the pricing recommendations generated from the elasticity module, which were shown on the dashboard was easy to understand and helped the company to improve in their gross margin and in GMV.

2.1.5 Algorithmic Pricing

Definition: Algorithmic pricing is used when companies automatically set a requested price for their products in order to maximize on the seller's profits. This tactic is also known as Dynamic Pricing Algorithms.

Chen et al. (2016) considers Amazon as an example when it comes to algorithmic pricing. The sellers maintain low prices on top selling products relative to their competitors. This is because they tend to have multiple sellers, and more competitive dynamics and in this way to attract extra buyers. The main challenge of this pricing strategy is that it is difficult to implement this strategy in traditional retail setting due to lack of data (e.g., competitors' prices) and physical constraints (e.g., manually relabeling prices on products). In addition, one of the issue in marketplace could be vulnerable to manipulation and fraud conducted by attackers, and security issues of consumers data.

However, Amazon's investment in dynamic pricing has led them to be market leader. In e-commerce, omnichannel, even in brick and mortar retail. Due to their continuous maintenance of low-price reputation, increasing charge for less price sensitive items by protecting their margins (BenMark et al., 2017).

Similarly, Baye et al. (2007) defines a factor to consider in setting price above incremental cost which should be price sensitivity of consumers. The optimal markup for a product depends on the price sensitivity of consumers and may be quantified by the product's price elasticity of demand. The optimal markup factor will be lower on items for which consumers are more price sensitive and higher for products where consumers are less price sensitive. The other factors that influence price sensitivity are product life-cycles and number of competitors. In addition, price experimentation also plays a key role in a firm to identify price sensitivity of consumers. For example, by simultaneously offering different prices to separate set of consumers.

However, sometimes pricing policy is not always successful. Therefore, Bolderdijk et al. (2016) examines the psychological effects of price incentives which provides insights of customer behavior under certain conditions to determine and find how effective or not to simulate the desired behavior. In other words, price incentives not only effect the instrumental value of money (what

money does for people) but also the psychological influence of money (what money does to people). For example, encouraging parents to pick up their children on time otherwise they must pay a fine. However, in this case the price incentives seemed to motivate parents to break the norm, risk here is price incentives are used to stimulate the socially desirable behavior. Although, many such behaviors are influenced by normative considerations.

2.2 Methods, Functionalities and Techniques

This section illustrates general overview of the methods and techniques that are used to determine the factors of pricing strategies from the current literature papers. In addition, some of the functionalities to be showed on the dashboard are listed in this section.

2.2.1 Regression analysis method

This method can be used to make estimation for the value-based approach. It can be used to measure and perform the overall satisfaction with the service that is formed during the service delivery process. In addition, it examines the different stages in the service delivery process that can be profiled in terms of customer value. For example, standardized regression coefficients (beta coefficients)² can be used to compare the impact of the value dimensions on stage satisfaction. (De Ruyter et al., 1997).

2.2.2 Compromise effect theory

In order to enhance the sales of the wide-range of mid-priced products, retailers can stock their products to some high and low-priced items using Compromise effect theory (Willart, 2015). In addition, a retailer facing a close discount should not try to compete on prices but adapt a different strategy. The thorough analysis of PDF allows to distinguish between two strategies. Firstly, this theory would lead the retailer to have a bell-shaped PDF and, secondly, to highlight the hypothesis that would make the PDF bimodal with a gap in the middle. There are also other methods which can be used to compromise effect theory are Mixed-modelling approach, Clustering approach, and Distance Matrix (Willart, 2015).

2.2.3 Maximum Likelihood Procedure

To estimate several aspects of Price Density Function at the store, and category levels on sales level can be calculated using Mixed-modelling approach. In order to follow this approach Re-

²Beta coefficient shows the relationship between rate of return of the stock and rate of return of market

stricted Maximum Likelihood Procedure can be used. (Willart, 2015)

Time series models (ARX and VARX) can be used to determine marketplace level and it is appropriate to use these models because it allows for endogenous series such as daily marketplace-level commission revenues. To estimate these models one can use the Maximum Likelihood Estimation techniques. (Stephen & Toubia, 2010)

2.2.4 Bayesian Method

The Bayesian method is becoming popular in making statistical inferences. It provides a coherent framework for empirical research and makes scientific information available to researcher. Accordingly, Chen et al.(2016) uses the Bayesian methods to make estimation of the price elasticities especially which includes sales promotion effects. As the method is used to address the issues of economic value, hence it's applied at the individual shop level which is created by the social network and distributed across its members (Stephen Toubia, 2010). In addition, Montgomery, A. L. (1997) also used Bayesian shrinkage techniques to estimate the demand at the individual neighborhood stores and to find the relationship between modeling and pricing decision.

2.2.5 Conservative Approach

To estimate the error correlations between price elasticities Hierarchical linear models (HLM) are used. Accordingly, a Conservative Approach (PRINCALS -a principal components analysis for categorical variables) is examined before applying the HLM models because it optimizes correlations between categorical variables (Bijmolt et al., 2005).

2.2.6 Machine Learning Algorithm

Machine learning algorithms are used to select sellers in order to determine the low prices which are the most important features used by the *Buy box algorithm*. The *Buy box algorithm* influences the sellers to choose dynamic pricing strategies. In addition, it determines the given product being sold by many sellers, which of the sellers will be featured in the Buy Box on the product's landing page (Chen et al., 2016).

2.2.7 Algorithmic Pricing Techniques

A technique was developed to detect sellers likely using algorithmic pricing. Some of those techniques are Web-based price matching tool, Random Forest Classifier,

- Marketplace web service tool: This tool is specifically designed to facilitate dynamic pricing. The main functions of this tool are changing prices, managing inventory, listing products. For example, amazon uses this tool to manage product inventory.
- Web Scraping approach: Due to some of the challenges in MWS, this tool is feasible to collect information of active sellers and their prices, therefore, Web Scraping approach can be used to obtain this information (Chen et al., 2016).

All in all, in order to use the above methods and to achieve the granularity in pricing Baye et al. (2007) address some of the main functionalities to include on the dashboard. Dashboards often provide a key performance indicator for an objective or business process.

- Key features of the market for each product
- Strategy for using the dashboard to guide pricing decisions
- Pricing decisions that need to be assigned to managers when pricing strategies accurately reflect specific market conditions.

Chapter 3

Interviews

In this chapter the process of empirical research is described, starting with the set-up for the interviews, the results to said interviews and a brief evaluation.

3.1 Interview Setup

Seven interviews were conducted with six different interviewees. By means of Linked-In, the contact information of pricing managers, business analysts, marketing intelligence specialists, and directors of the wholesale companies in The Netherlands has been collected.

The interview with the pricing manager from company X (a wholesale company) was conducted right after the initial literature review. It was mainly introductory in nature: to obtain information about the context of the pricing initiative, which pricing strategy they are focusing on, who are their customer target groups. Lastly, to have follow-up face to face meeting at company X. Series of other interviews were conducted with different pricing managers from (Technische Unie), a pricing manger from Kramp, market intelligence specialists from Wiltec, financial director from Egmont Group, director wholesale & procurement from DLF. The overview list of companies and the role of interviewees are provided in the Appendix B.1.1.

The interview itself was conducted with one interviewer, alternating between taking notes and asking questions, to avoid missing information. The interview was of semi-structured nature, to give freedom in guiding the conversation, not limiting the expressiveness of the interviewee, but still a list of topics and need to know questions were kept in mind. Due to practical reasons the follow up interview with company X was conducted with two interviewers.

3.2 Questions set up for the interview

Based on the literature study, interview questions were setup and most of the interviews were conducted over the phone. Moreover, for the follow-up meeting with company X, the interview was conducted at Eindhoven. With these questions, individual managers were asked to answer based on their experience how they relate these questions to the existing pricing strategies, which were identified from the literature. Moreover, to obtain answers regarding managers requirements on dashboard. Accordingly, the questions were divided mainly into 5 sets. The identified questions for each set can be found in the Appendix B.1.1.

- *Pricing Strategy Questions*: To understand company's pricing strategy, their customer target groups and their market position with comparison to other brands.
- *Process of Pricing Questions*: To know about how dynamic the company is in process of price setting and who does the changes in these processes of pricing.
- *Business Logic Questions*: To understand the business rules of the company in pricing especially their Optimal price, Current price and New Price.
- *Dashboard Questions*: To obtain requirements of pricing information that should be displayed on the dashboard.
- *Tooling Questions*: These set of questions are framed mainly to understand the if the company is using any dashboard or pricing tool, and to know its integration process with the market.

3.3 Results

In this section the results of the conducted interviews are given in summarized form. They are here structured by topic and relevance. Only relevant information about mainly the results of above sections are presented here. The general overview results can be found in Appendix B.2.

3.3.1 Pricing Strategy

Some insights of each interviewed wholesale companies concerning the pricing strategy, customer target groups and market position.

Company X is an international wholesaler mainly in MRO (maintenance, repair and operating supply) articles in general industry. Their customer target groups are in a range of industry sectors and categories that might affect are fluid power, machining, assembly, transmission and automation, tools and equipment. Their market position has been ranked number 27 with biggest sales among Britain's top private companies. Currently, their pricing strategy is mix

of Competitive based, Value based and Price Anchoring . They would like to focus on Price anchoring because it can be upgraded to pricing methods and it is relatively easy to explain. They would like to improve their customer perception profitably by focusing on different prices which has list price and selling price because both are dynamic and organized.

Technische Unie is another international wholesaler company where their current pricing strategy is cost based, but they would like to focus on Value-based pricing. Their main target customer groups are insulation engineers, builders, contractors, service and maintenance companies. In total, there are 5 categories wires and cables, electrical components, heating and climate systems, sanitary products, power tool. They would like to improve their customer perception profitably with added value services. Their position is mainly focused on additional services and value addition to their customers. Because most of the wholesalers focus only on logistics, they tried to support their customers in the broadest possible way. Moreover, they are a market leader with 1/3rd of the market share compared to their competitors.

Wiltec is a wholesaler of products mainly used in a production environment, except work wear which is broader. There is a dichotomy between consumables and investment products. The investment products are fully equipped spray booths, liquid pumps, large work wear tenders and office furniture. The consumables are sandpaper, cleaning cloths, tapes, personal protective equipment and office items. In the upcoming 3 to 5 years they would like to focus on five markets; automotive, construction, semi government, metalworking industry and agriculture and food. Their position in the market is difficult to explain because it is different for each product or market combination. Until now, they always approached the customer one-sided from a single product group. As they did not consider the full product range, therefore they couldn't reach the desired synergy. Therefore, currently they are creating new propositions to broaden the added value of Wiltec for their customers.

DLF is another global wholesale company which has a worldwide market in grass seeds and their market price is based on supply demand (which is kind of production demand) with value-based pricing strategy. DLF would like to improve their customer perception profitably by increasing market share and selling more value-added products. They are market leader in Europe with 50 percentage of high market share in Europe and 25 percentage of market share worldwide. They use production cost leadership to compare with other brands or competitors.

Van Egmont Group is a wholesale company with trading in building and electronic materials for industrial markets. Their pricing strategy is combination of two strategies, they have two forms of services i.e. delivering materials and logistics and transportation which is priced by competitors. External services like tube, VME in this case they have value-based pricing. Basically, it is a combination of both Value-based and competitive based pricing. They would like to improve their customer perception, profitably in the process of ordering in relation with customer and

business. On online channel they would like to promote educational and training services.

Kramp is another wholesaler company with all kinds of agricultural products, for farmers, also spare parts for tractors and machines on land. They are active in 21 countries all over the Europe with 10 different warehouses 800 million turnover and aiming for 1 billion in 2020. They started with new strategy in two years ago introduced by consultancy company. Focusing on more future proof system, to calculate the price. Currently, they are focusing on value-based pricing and they try to set the optimum price that's the price where customer is willing to pay. Their main customer target groups are dealers and farmers but to farmers they deliver via products dealers which is their main concept. Their main market is agricultural market, construction market, (ORM)builders of the machinery, garden Products, sometimes they focus on industry markets. They would like to improve their customer perception profitably in many ways, firstly, they would like to set their stock level and to provide all kind of training to help their customers to set the good cost price.

Secondly, they would like to offer net price for their dealer, so that the difference between these prices will be profit for the dealers. For example, if the farmer is not buying from the dealer and dealer is not selling anything then the cost price is not correctly and if the cost price is correct and net price is high then their dealer may buys from their competitors therefore they would like to offer good price for their dealers. In several countries they are market leader. In The Netherlands, they have more than 40% of the market share, in other countries like in Italy they have 5% market share and in Romania it is 1 or 2% (Starter markets in Romania and Italy), so it is dependent on that country. Their company is not a brand but it is a company who sells other brands. Their biggest competitors are in Germany, Switzerland, Bepco-France. They compare with them always on price, in some countries their customers are very price sensitive. For example, in Poland customers are not loyal whereas in Switzerland their customers are less price sensitive and they are more focused on relation. They don't want to be the cheapest price, but they want to deliver the extra services to the customers. They don't want to set the price too high or low. They are more focusing on helping and adding value to their customers.

From this result, it can be said that all the companies are mostly focusing on Value-based and Cost-based pricing. In addition, they would like to improve customer perception probably with added value services to their customers. Therefore, it can be concluded that the main approach of the interviewed companies would like to focus more on Value-based pricing strategy.

3.3.2 Process of Price Setting

Company X is operated in both ways, online (25 to 30 percentage) and offline (on one remarked areas) shop. According to pricing manager of company X, the online shop is only a digital solu-

tion. They would like to set their prices on daily basis. The main users of this price processing in company X are operational managers.

The Technische Unie Company is also operated in both ways of trading (online and offline) whereas 70percentage of sales is triggered by online process. However, they do not set their prices very often because it depends on their products. If they have 10-20 percentage sales, then they set their prices as regular as possible mostly within every quarter, and for rest of the assortment it is adjusted once a year. In addition, the changes triggered by their suppliers, they administrate these changes as well, but main challenge is to review of price and transferring new prices. The pricing team which consists of 4 FTEs, change the prices. This is a new setup where most of the offline companies does not have this method.

At Wiltec the process of pricing takes place within every negotiation with customers, and for online channel it is static. Here the main users are Accountancies (Sales Managers).

DLF follows very traditional way of marketing. They are not having any online shop at all, they do not do any business through the internet. It is all offline marketing and very traditional. They update the prices according to the market circumstances, sometimes they do not update when the market is stable. Last year they updated 6 times in each month. It is very dynamic. The process of pricing is tailor made and price list is internal price list, so they do not send their price list to their customers.

Van Egmont Groups' process of pricing has two aspects, one side it is supplier driven, for special materials which is not in mainstream it is once a month, and the other side for their mainstream of customers to update the prices twice a year. Combination of sales and advertising team does the process of pricing. Their online channel is mainly for process of ordering to customers.

Kramp is mainly focused on B2B marketing and they have both online and offline shops. They have their own physical shop most of them are in Eastern Europe and now they are starting in Northern Europe, created by themselves and they have franchise on it. However, their 90% of sales is done through web shops. Their process of pricing takes place every quarter where they calculate all the prices, sometimes there will be an emergency update if there is mistake in input matrix for example purchase price. Perhaps, in future it is more often, like once in a month or every day. Now they deliver their price list to their customers so if they change the price then it becomes too often to send it to their customers. However, they are re-creating their own environment for that. Along with the interviewee, there are two other pricing managers who does price setting with other assortment managers. In every country there are assortment managers who is responsible for assortment to change or update the price and based on assortment manager local inputs, they set their optimum price. Besides that, they have product

group managers who are responsible for product group on global network and if their turnover margin is not going as they wanted. In addition, they maintain the price got from the retailers to recommend the retailers prices.

All in all, the above listed companies are dynamic in updating their prices and sometimes it is based on the market conditions.

3.3.3 Business Logic

According to the pricing manager from company X, Optimal price could be different depending upon the pricing strategy. For example, it may differ when looking for profit optimum or cost-plus based strategy. However, according to a pricing manager from another wholesale company (Technische Unie), the Optimal price is usually a couple of percentages above the cost. However, they strive to apply new business rules for their pricing strategy such as dropping the price (per product) by 50 percentage. Moreover, in terms of price elasticity, based on information of KVI's they share that information in pricing, and if the customer has a discount then they publish only that discount.

For DLF the Optimal price would be 10-15 percentage higher than their current price, and their sales managers have freedom to set their new prices to 5 percentage up and down but not based on business rules. They do not have a document protocol for the salesperson where they can follow some decision, it is basically a Tailor-made trading. Their Competitors price is not open until now as they are not publishing it publicly. They compare with their competitors' price by collecting information from business areas brokers.

As Van Egmont Groups' pricing information is confidential, so it's not been disclosed to the interviewer. However, for competitors' price in the market they compare with their competitors by delivering material as a wholesaler. They will publish discounts based on the project otherwise usually they will not offer discounts.

In Wiltec wholesale company currently they are working hard to get the insights of optimal price. According to marketing intelligence specialist, they face the problem to tackle the segmentation of customer groups. In addition, during the time of their analysis they face problem to determine the process of pricing and they found that there is no logic at all in their pricing strategy. Their optimal price should be a price based on the customers activity and based on type of customer (customer segment) and the type of product (what value provides it the customer). All in relation to their competitors. However, currently they have no idea what their optimal price should be, because their current pricing policy is completely random.

For Kramp their Optimal Price depends on their products, because for some products it is good

to have big markets and for some its not. Besides that, every 3 months they recalculate the price Based on Reference Price (a price is which same for the whole Europe), they check with clicks on the webshop. For example, if everybody is checking the price but not buying the products then they will lower the price or its vice versa. According to pricing manager of Kramp, if the price elasticity is high then the profit is less, if they lower the price then they get bigger on the quantities with the less elasticities or if they higher the price then they lose more quantities but they win the profit. For instance, product of 10 euro but if they make it 1 euro cheaper and sell two times more in the end then they have lower margin which is absolute margin in euros. The effect is bigger on the quantities with lower elasticities. If the product is very elastic which has high impact, then we lower the price and gain a profit. For products have low elasticities price changes does not make a much difference. They compare on product level with their competitors, let's say within the bandwidth of the 5% of their competitors' price mainly for most important products. Moreover, their new price is set based on the business rules like checking what is the purchase price, no. of clicks on the product all kind of input matrix.

Accordingly, it is determined that they should lower the price if they are not willing to pay, which is calculated based on elasticity, then they get an new cost price which is the price shown on the web shop and also consumer based which is farmer based price at the dealer. Dealer can always choose their own price which is the recommended price (net price) from them. Dealers gets a discount from Kramp that's the price the dealer is paying, and it is a net price. Discount is set per product group, depending on the customer he gets different discount. For instance, they have a very big customer but if they are buying only 5% of their total turnover from Kramp that means they are buying at other products from their competitors so that customer is less important to them. In addition, they are building a Price Engine for their web shop to publish their prices. Based on the price elasticity of a group they have a Qune status (where they have one product which is a part of a product group and discount profile where the combination this gives a certain discount) and huge status, for future (discount per product, within the same product group the discount is going to differentiate the product). According to the interview their total margin is the difference between cost price and purchase price. For example, the purchase price is 5 euros and cost price is 10 euros and they have a gross margin of 5 euros, this 5 euros is not only profit for them but they have to share together with the dealer. If they give them 25% discount, then dealer will get 2.50 discount for that product (that is also which the dealer earns) and still they left with 2.50 euro. Based on that gross margin of 5 euros and based on the customer also (for example if customer gets 1-euro discount then they get 4-euro profit or vice versa), it is divided between dealer and them (Kramp).

Overall, for the companies which follow a traditional way of selling the products, it's difficult to get their competitors' prices.

3.3.4 Tooling

Among above mentioned companies, most of them use Power BI tool for sales information, invoice sales, turnover margin and price sensitivities. Their market automation process is integrated with the ERP system for transactional and tabular data. However, one of the companies (Wiltec) use QlikView tool but there are few drawbacks associated with that tool such as it is difficult to make visuals attractive, and their market automation process is integrated with CRM system.

3.3.5 Requirements for a dashboard

Some insights concerning the managers' requirements of pricing information to be displayed on the dashboard are mentioned in this section. These requirements are essential for the interviewed managers, because it helps to know what are the potential drivers that impacts dynamic price changes in the market, or there might be a legislation influence on the market. Moreover, to understand their customer behavior and the increase or decrease in the number of customers.

- Market Dynamic and Market prices with different indications for area managers to make a deal.
- Their current Prices, Trends, Currencies and the market from brokers (brokers have quotations), and production acreage (surface with production acreage) to see the balance between demand and supply.
- Suggestions on groups of customers for best discount per product and price elasticity.
- Discount strategy logic for each different product type.
- Represent a dashboard to separate the product ranges to come up with the pricing strategy and price strategy for the customer groups.
- What material or product group is better than the others for certain customers? which customer it is for, and what product it is, and to discuss with account manager why there is price difference between two customers (for example why the price is higher for one customer than the 2nd customers)
- The difference between the costs and Willingness to Pay (WTP), so that a company can base their pricing strategy of that information.
- Stock position of their competition since they often see that their assortment is sold out compared to many of their competitors but still, they have the products in stock. Perhaps, this is an incentive to increase price or promotions.
- Split the dashboard in two ways, one as operational dashboard (for managers) and on the other hand for the management perspective (for CEO's, CFO's, CIO's). The dashboard should be easy to understand and talk about their pricing strategy like trade-margin out of

sales transaction (in operational dashboard), to identify the number of manual overwrites (is very important).

- Suggest a price and stimulate people to start working alongside the system. Later the result can be compared with the price suggested by the system and the pricing model be improved using that result.
- Price recommendations and its impact on changing purchasing price for their customers.

Some insights concerning the most and least essential features to be included on the dashboard.

The most essential features are

- The customer behavior on price changes and figures on Budget and Price elasticity.
- Benchmarking of certain products groups with certain customers and for different suppliers.
- A dashboard should be a tool where a wholesaler can see sales and margin performance with customers. For example, Wholesaler with 10-20 customers in the market with same market size, a dashboard should help them to discuss with their account managers why to higher profit at certain customers and not to other customers where they think they can't increase the price?
- Wholesale Quotations from brokers, Currencies, Production acreage and Statistics on import and export.

The least essential features are

- The competitors' prices which are found online. This price is not so important for some of the managers because they get their competitors prices from their brokers and for some companies who have their major business through online channel can easily get their competitors price through online.
- Promotions are minor for some of the companies. Whereas, promotions on products in wholesale companies is very limited, it just provides 5 % of sales on promotions. Although it is very limited on sales but it is very important to see on the dashboard because it provides information on price elasticity. (Medium Priority)

Furthermore, most of the companies would like to monitor their competitors' price but one wholesale company (DLF) would like to know others price only as a reliable source because they receive their competitors' prices from broker quotations. They would like to see their competitor's prices as a visual sight, if they want to deeper insight to analyze the data then it can be shown on the table. However, is difficult to get competitors prices for offline shops.

Overall all the companies would like to apply the business rules on dashboard to Monitor sales, (to see Sales drop or increase), for Supply positions and Promotions based on competitors, sales conditions on certain product and some basic business rules in terms of relationship with the customer. In addition, when they update a new product, they would like to see the changes

and compare that with their competitors.

Therefore, the dashboard should be designed in such a way that, it should reflect the requirements of the interviewees. In order to do that, the below list provides some of the requirements to design a good dashboard.

- Firstly, it should be simple enough for marketers to work with and understand what is happening.
- Secondly, it should offer a valuable pricing strategy (in this case it is Value-based pricing strategy) to optimize the prices (Revenue, Gross Margin).
- Thirdly and most importantly, it must be able to identify heterogeneity because of heterogeneous customer groups with different price sensitivities and price elasticities. This is also because of combining seasons with different price elasticities or other drivers of price elasticity. For example, the price elasticity of ice cream in summer is different.

At last, it can be said that the above-mentioned requirements will be considered while designing the dashboard.

3.4 Evaluation

In this section a reflection on the setup and the execution of the interviews is made. The purpose of this is to give insight in what could have been planned and executed better.

For the interview with the business analysts and marketing specialists, there were improvements possible in the preparation part. Because the interview was planned very shortly in advance, there was minimal preparation possible for structuring the interview. The only problem that arose was a minor error in communication, when certain pricing terms were difficult to understand for some interviewees.

Therefore, for a possible next interview setup, explaining some pricing terms should be taken care in advance. Otherwise, interview setup should be done more for pricing managers and wholesalers than analysts.

Chapter 4

Design Rules

Pricing is a process which defines a pricing strategy and execution with the objective to define the price that will maximize the company's revenue. Besides that, it fulfills the sales strategy of the company. Campbell (2019) says that changing the prices from one's gut feeling or out of the air does not count as a process or strategy. This is because, the optimal price depends on various drivers such as season, festivals, weather, competitor's prices. It therefore demands often dynamical pricing. Moreover, according to research by Bain and Company, only 18% of B2B companies or wholesale companies' prices are dynamic (Kermisch et al., 2019). Therefore, now it is the time to utilize this opportunity to build a better pricing decision making process (Baker et al., 2010). To improve the process of pricing in wholesale companies or in B2B companies design rules are defined in this section. These rules are used to design dashboards to support the pricing decision process. In this study, design rules are defined from identified pricing strategies found in literature and by incorporating the requirements of pricing information from interviewees on a dashboard at a more higher level.

Ceresia & Montemaggiore, (2010) proposed that goal setting plays a significant role in the improvement of decision-making processes. Moreover, the impact of goal setting practice on company's performance can be assessed by Balanced Scorecard (Ceresia et al., 2010). With this regard, a suitable approach to apply for the pricing decision process is Kaplan & Norton's (1992) Balanced Scorecard framework (BSC). This framework not only helps management in monitoring the implementation of companies' strategies but also in (re)designing their strategies. Although this framework has been introduced 30 years ago, it is still been often used as a valuable framework even in today's generation. According to the management tools study by Bain & Company the BSC framework remains one of the top-performing frameworks in use today (Rigby & Bilodeau, 2015). Therefore, BSC is chosen as a framework to design rules for defining a price strategy for wholesale companies. BSC is defined as a set of metrics which is used to identify a company's strategy or key performance indicators (KPIs) to support the strategic management execution and formation (Kaplan & Norton, 1992). In addition, BSC is used to monitor and improve the performance of various drivers and outcomes of company's goals. In particular, BSC translates the company's strategy into a set of (causal) relationships

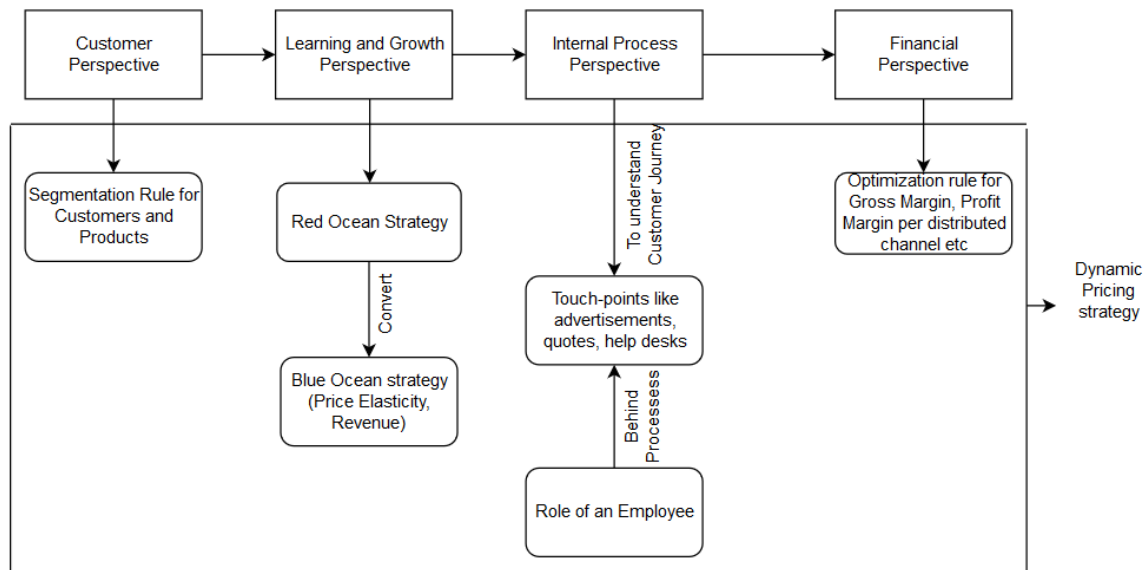


Figure 4.1: The Process of Pricing

between the strategic and operational objectives and measures contained in four perspectives to adopt a dynamic pricing strategy.

The first perspective refers to the customer perspective, to group the customer and customer products. The second perspective, learning and growth, refers to innovation and learning about the value-added services to customers. The third perspective focuses on the internal processes, and finally the fourth perspective is the financial perspective (Ceresia et al., 2010). Accordingly, the framework (Figure 4.1) has been designed to show the flow of process of pricing.

Firstly, the customer perspective begins with clustering customers in combination with the relevant products to identify the groups who may have similar pricing behavior. After segmenting the customers to different groups, it is very important to learn about how they value the various product attributes and/or service(s) in relation to the price. In an efficient market, the market reflects all available and relevant pricing information especially in mature markets with identical products, where the customers have all market information. There, the prices are close to cost price. However, in those markets, customers have complete knowledge of the offerings and switching costs¹ to move from one supplier to another are absent. When these customer switching costs are absent, firms try to get a degree of market power over their repeat-purchasers. This means that firms depend on current market shares for their future profit (Klemperer, 1995). Specifically, the markets which follow a traditional way of marketing in competing with their rivals at a greater share of existing demand at a crowded market space (Kabukin, 2014) are

¹The costs that results from switching to a new product or new service are called as switching cost.

called Red Oceans. However, markets without competition are named as Blue Oceans (Kim & Mauborgne, 2005). Therefore, the conversion of Red Ocean to Blue Ocean Strategy will help companies to switch from cost-based pricing strategy to a value-based pricing strategy and will increase profits.

Secondly, in order to create blue ocean companies, wholesalers need to learn about their customers (for example, what is a unique offering) or search for a customer group that until now is not served because the old value proposition does not suit them. An example here is the Cirque du Soleil case (Kim & Mauborgne, 2005). The Cirque du Soleil is one of the Canada's largest cultural exports and has achieved the highest level of revenue in less than twenty years of time. The main aspect of their success is that they did not focus on leading industry rather in a declining industry in which traditional strategic analysis pointed to limited potential for growth. Moreover, they did not target customers such as children who were already from the shrinking circus industry. Instead Cirque du Soleil created uncontested market space for new group of customers (adults and corporate clients) that made the competition irrelevant. For an unprecedented entertainment experience, it made customers to pay a price several times as high as traditional circuses. In this way, the wholesale companies can also reinvent their market and switch from competitive-based pricing to value based pricing. In addition, the competitive strategy is dominant in red oceans called Red ocean strategy. Specifically, the market that follow a conventional approach to create a defensible position within an existing market to beat in the competition are called as Red oceans (Kim, Mauborgne. 2005). Therefore, value based pricing plays an important role in learning about the customers. To understand extra value service to improve the value proposition, it is useful to know the touchpoints in the customer journey. Moreover, the role of an employee behind the process of pricing is a crucial point in the Internal Process Perspective. At last, the Financial perspective is defined to optimize the margins, revenue and elasticity etc. The detailed explanation of each perspective is described in the following sub-sections.

4.1 Customer Perspective

As mentioned in Section 2.1.1 the research is mainly focused on Value-based pricing. So, the process of pricing begins from the added value to the customer which has been explained briefly in the customer perspective. In this case, Customer Perspective refers to a looking for value of extra attributes or services that are highly valuable for customers. Advanced segmentation of customers and adding extra services or product attributes plays a significant role in this perspective.

Based on the complexity of transactions companies need to develop their own dynamic-pricing engine which helps to improve and speed up the decision-making process. Moreover, com-

panies need to follow a segmented approach which supports statistical clustering techniques. The purpose is to create groups of customers which have similar buying behavior and groups of product which have similar pricing behavior. For example, this behaviour can be found based on recent sales data, product life-cycle, level of competitiveness etc. In addition, companies might choose a value-based pricing approach for the products that have a higher value. This can be determined based on the customers' buying factors and quantifying them using a combination of calculations and customer interviews (for example, checking the reliability of offerings with the company's main competitors) (Bages-Amat, 2018). In industrial markets segmentation is based on firmographics such as customer size, industry and customer location (Zhang et al., 2014). However, it is also proposed that segmentation is based on buying behavior and relationship with sellers which can be determined with the reference prices. A reference price is a price that customers are willing to pay for particular goods or services. It can be determined based on the past prices and prices set by the market leader with most brand loyalty etc. For example, in the beer factory people would instantly think of what beer would cost but if the highly branded company offers it for 20% lesser than they will be willing to buy it for lower price. The reference prices can be differentiated into internal and external prices. External reference prices are the prices which are common to all the customers (for example, manufacturer's suggested retail price and the prices of other brands), whereas internal reference prices are individual specific and are set based on customer's previous buying behavior (Zhang et al., 2014).

Most times companies obtain their price boundaries and competitors' prices through online sources, news articles and market indices. However, each company can create a self-learning algorithm (an analytics pricing engine) that incorporates with all customer segments willingness to pay (WTP) and accordingly can update the prices based on the available information. WTP can also be represented in terms of click conversion and volume revolution. Moreover, according to Kermisch et al. (2019) companies should respond to price changes by targeting price sensitive segments because being adaptive in B2B pricing matters more than ever. In the continuous shifting market if the company's pricing strategy did not respond then there is no question of getting disrupted from other companies. Therefore, companies should be adaptive in nature. If there is enough data, then companies can split the customer segments into subgroups to run differentiated price tests. In addition, for managers to track these price changes, inclusion of a performance management layer makes it easy to read the visual output. Besides that, for a sales team to quote on day-to-day basis to integrate the price engine with tools (Bages-Amat, 2018). Besides that, an investment in upgrading the data, tools and process will build the capabilities of dynamic pricing (Kermisch et al, 2019).

4.2 Learning and Growth Perspective

This perspective refers to the continuous improvement and innovation process of pricing which creates value to reach the internal process objectives. In other words, it refers to learning what attributes and services are valued by the various customers and improving the value proposition to these customers. Moreover, along with the improvement of the value proposition the pricing strategy and process of an organization will be improved.

Based on the defined price, firstly look for an attribute and/or service that is highly valuable for customers. However, an increase and decrease in price in relation to certain product attributes or services indirectly affects the production and delivery processes and thus also the related competences. Pricing strategies such as Cost and Competitive based strategies are used to analyze the competences. The downside of these types of strategies is that growth and profits are limited due to company offers to customers and the narrow margin (Campbell, 2019). This ultimately effects the price elasticity of the product. This is because, the companies will lower the price to increase the demand compared to their competitors. Thus, it leads to lower average profits. Therefore, instead of striving hard to approach a competitor's rivalry, it will be more effective and profitable for wholesale companies to add extra value for their product i.e. blue ocean strategy. The blue ocean strategy is defined as creating a new uncontested market space, opportunities, value creations with new customer bases and with rapid profitable growth without any competition between companies (Kabukin, 2014).

In addition, this will make it easier to look for customer groups that value certain services very highly and cost price for those services that have a low or at least reasonable price. Moreover, for the identified customer group it is easier to determine the price elasticity and revenue. The price elasticity measures the responsive change in the quantity demanded in relation to its price change. Therefore, price elasticity can be calculated by this linear equation:

$$Y = mx + b$$

$$Q(p) = \alpha p + \beta \quad (4.1)$$

In this case, the Y-axis will be $Q(p)$ and X-axis is p . The $Q(p)$ is the quantity of the product which is dependent variable. p is the Sales Price of the product which is the independent variable. α is considered as a slope which is expected to be zero or negative (where demand of sales decreases when price increases). In addition, β is the Y-intercept which is $Q(p)$ intercept which is calculated with the change in quantity divided by change in the price. The main reason to use a linear equation to calculate the elasticity is because in this study it is focused to determine the optimal price at which the revenue will be maximum. The revenue is estimated based on the quadratic equation without intercept c :

$$Y = ax^2 + bx$$

$$R(p) = pQ(p) = \alpha p^2 + p\beta \quad (4.2)$$

The equation $R(p)$ is differentiated to find the optimal price under the hypothesis of a linear demand curve. R is a concave function of p , when α is assumed to be negative (demand decrease when prices increase). Consequently, the critical point will be a maximum point. Therefore, the optimal price for revenue is calculated by:

$$P_{maxrevenue} = \frac{-\beta}{2\alpha} \quad (4.3)$$

Moreover, the linear demand curve also be determined from $Q(p) = -\alpha p + \beta$, in this case α should be positive, and the signs in equation 4.1 and equation 4.2 will change. Besides that, it will also represent the upside down parabola.

Furthermore, Kim and Mauborgne (2005) proposed that value innovation is the cornerstone of the blue ocean strategy because the creators of this strategy benchmarked competition as irrelevant to open new uncontested market space. In addition, to create a leap in value of buyers and for the companies. Moreover, Burke et al (2016) applied beach theory² to prove that most of the (Dutch) retail firms operate in heavily contested markets. The Beach theory results showed that blue ocean strategy can be successfully used at a generic level within the industry. The statistical analysis of this theory proves that firms which follow blue ocean strategy have improved in their average profits and also developed the long-term relationship with their customers. Besides that, a competitive strategy is only effective for short term. For example, this theory can be illustrated with different ice cream firms on the beach, which are identical in products and services. The variable in this case is the location along the beach. Firstly, at the beach where consumer density is equally distributed three firms are selling ice creams. In the beginning, all the firms compete to maximize their profits by attracting customers. However, if one extra firm enters this competition, then each firm faces tougher competition which causes lower profits. As a result, more firms means more competition and it leads to lower average profits. This applies to the same situation of red ocean markets, because firms following red ocean strategy approximately offers the same product which leads the firms to compete on price and to set it as low as possible. However, that results in declining the firms profits. Therefore, Burke et al. (2016) solved this issue by creating a new market space through blue ocean strategy. For example, if a firm relocates to the new beach³ and similarly other firms have entered other new beaches. This creates a large consumer demand by innovating untapped markets to differentiate themselves. Now, all firms are located further apart and each firm's

²According to Burke et al (2016), it is a theoretical framework within which two strategies are nested for comparison (i.e. competitive and blue ocean strategy).

³This beach does not have to be real beach. It can also be the case that there is untapped demand 'on the beach' where there are customers between two vendors who consider the current distances too great.

average profit has increased with larger consumer base.

Secondly, pricing evolves over time, hence Kermisch et al. (2019) proposed to start with a clear pricing strategy which aligns with a company's pricing strategy to create Dynamic Pricing. For example, an airline pricing strategy should be adjusted for each seat in such a way that it should help to maximize the revenue on every flight, along with considering other factors such as route, season and customer type. In other words, a firm has to consider a range of factors (or variables such as cost, supply and demand) to make a clear decision and to adjust price points on a monthly or hourly basis to protect price margins and to prevent share loss in the face of change. Moreover, according to Baker et al.'s (2010) point of view, the process of pricing in most of the companies is random due to lack of structure, thoroughness, and underlying analytics. Processes are the backbone of the pricing infrastructure; hence companies should define a process of pricing in such a way that it should govern the decision making and core pricing activities. However, pricing decisions might differ for each industry and company. For example, to keep prices aligned with market levels a chemical company might focus on supply and demand. To adjust a set of customer groups and to find the next-best alternatives a consumer electronics manufacturer might concentrate on customer value. In addition, to govern the discounts for different products and volumes an industrial-parts maker might focus on the rules and policies (Baker et al., 2010).

4.3 Internal Process Perspective

Internal Process Perspective refers to the efficiency and productivity of an organization which is dependent on the internal process. Internal processes are behind each touchpoint of the customer journey. For example, touchpoints can be advertisements, promotions, shop, quotes, help desk, service and delivery.

The process of pricing in special price requests or exceptions often gets out of control. In order to manage such kind of requests and exceptions, companies can create advanced processes like "bid desks" which provides sellers with a right decision-making process in setting their price levels (Baker et al., 2010). Processes should be addressed with clear ownership and accountability which adds value to the pricing decisions. Therefore, in an organization, employees' skills and their roles also plays an important part behind these processes. For example, executives who are responsible for maintaining data structure and supporting the operating model should take several steps (such as to link the relevant data sets, to institute weekly pricing forum and to highlight the target earnings of each price change) (Kermisch et al., 2019). These changes can enable effective communication and faster information sharing about the pricing strategy across the organization.

Moreover, according to Baker et al. (2010) executives are not only responsible for managing day-to-day pricing activities, but also for coordinating the roll-out of pricing methods, and counseling sales managers and sales representatives on the use of formal pricing methods. Besides that, they are also responsible for controlling the impact of pricing metrics and strategies and embedding pricing methods and tools in the company's culture. A firm should separate the pricing group from the sales group that is responsible for negotiating prices with customers. This is because, it is difficult for pricing managers and negotiators to maintain a healthy balance, when both price groups and sales groups reside at the same place. This division of groups helps to evaluate the overall health of the high-performing pricing organizations.

4.4 Financial Perspective

This perspective refers to financial aspects and the optimization of pricing activities that are important to shareholders such as total sales, gross margin and 'EBITDA'⁴. To reach these goals, financial perspective targets to define the price margin, which shows the price elasticity, price sensitivity, economies of scale and profitable growth. Since financial perspective overlaps with the learning and growth perspective, elasticity and revenue have been used in that perspective to learn and grow about the customers.

Baker et al. (2010) says that, in order to measure the financial and operational health of an organization, every company should have a set of pricing metrics. These metrics might include the average selling price, discount, gross margin. These are operational data (which includes a number of pricing exceptions and win/loss percentages). There are also special measures to track the progress and impact of specific pricing initiatives. Combining all these metrics, a simple and effective dashboard can be developed which also provides feedback about successful and unsuccessful approaches. Therefore, this perspective aims to determine gross margin and sales margin. In addition, to determine the optimal price at which the gross margin will be maximum. Moreover, it is calculated based on the quadratic equation with intercept (Fonseca, 2017):

$$G(p) = (p - c)Q(p) = \alpha p^2 + \beta(p - c) - \alpha pc \quad (4.4)$$

Where c is the cost price, p is the Sales Price and $G(p)$ is the gross margin. As c is always positive, therefore that the price that maximizes gross margin is always bigger than the one that maximizes total revenue. Next, the equation $G(p)$ is differentiated to find the optimal price under the hypothesis of a linear demand curve. G is a concave functions of p , when α is assumed to be negative (demand increases when prices decrease). Consequently, the critical point will be a maximum point. Therefore, the optimal price for gross margin is given by:

$$P_{maxGrossMargin} = \frac{-\beta + \alpha c}{2\alpha} \quad (4.5)$$

⁴Earnings before interest, taxes, depreciation and amortization which calculates the financial performance of the company's overall net income

Most importantly, the incentive design plans should be taken into consideration in such a way that on one hand it should balance the increase in the revenue and on the other hand it should achieve healthy margins and a low discount. Moreover, the most effective and valuable approach is to normalize a variable such as account size and product mix by margin or by discounting performance.

Chapter 5

Prototype

Based on the above-mentioned design rules and decision process, a dashboard has been designed to incorporate the requirements of wholesale companies. This chapter explains some of the assumptions and steps taken to design a dashboard to address the valuable pricing strategy. To ensure that the dashboard is designed carefully and efficiently the paper by Vilarinho et al. (2017) has been used as a reference. The additional information of how the dashboard is designed can be found in Appendix C.

“A dashboard is a visual display of the most important information needed to achieve one or more objectives, consolidated so the information can be monitored at a glance. (Gannholm, 2013)”. In this study, the decision process of pricing framework (Figure 4.1) has been used to implement the dashboard which meets the necessary requirements of the interviewees. Moreover, according to Ganholm’s research most of the business leaders use dashboards to improve organizational performance. These help users to identify and respond to problems. Therefore, dashboards are often designed to represent the relevant information to monitor organizational performance and to intervene when appropriate. This can be generalized to dynamic pricing dashboard which shows other relevant information such as the decision process of pricing. The draft of the dashboard consists of four main pages and one overview page, defined by taking into account each perspective with pricing information (Vilarinho et al., 2017).

The dynamic pricing dashboard is used as prototype to evaluate the price decision-making process. A prototype is a tangible artifact, not an abstract description that requires interpretation (Ganholm, 2013). The main reason to use a dashboard as a prototype is because it supports the product innovation process and idea improvement. In addition, it is easier to communicate with the interviewees through prototype requirement specification for evaluating their requirements on dashboard and decision process of pricing. Consequently, better and more concrete feedback will be acquired from the interviewees. Furthermore, the other areas where the prototype can be used are to explore an idea to guide the developers during the further development and implementation. So, that user can test and verify by designing a certain prototype.

The dashboard is designed using the Power BI tool. It is a Business Intelligence tool used for cloud-based data analysis. Compared to other BI tools (such as Tabelau, Qlikview) Power BI is more simple, powerful and user friendly for BI developers, data analysts and business analysts. Moreover, it can be used to model complex scenarios in a typical enterprise setup (K. Gowthami, 2017). For reasons of confidentiality, data related to this dashboard have not been disclosed in this thesis.

5.1 Customer Segmentation

Every wholesale company desires to treat the customers fairly while maximizing their customer contribution to the company's business or success. However, many wholesale companies tend to treat all customers the same, not recognizing that some customers are looking for value added services to help them lower their cost of doing business. On the other hand, there might be other group of customers who don't appreciate these kinds of services or they might not require these services. This distinction begins to make the case for segmenting customers (Bell, 2011).

A successful pricing starts with the identification of customer segments (Bunte et al., 2016). Therefore, the first page in the dashboard begins with segmenting the customers. Using the classification and clustering techniques of Power BI, customers segments are classified into distinctive sub-groups. The in-built Power BI clustering techniques are k-means clustering, scatter plot clustering and custom visual clustering etc. As in this data set, the customer segments and sub-groups were defined beforehand. From these sub-groups it is interesting to identify the customer buying behavior (Bangerta, 2010). Therefore, in this tool we have used the scatter plot clustering. This graph is shown in top left block (Figure 5.1). Here the independent variable is Price (Invoice Amount) which is plotted on the Y-axis and dependent variable is Quantity (Invoice Qty) which is plotted on the X-axis. This is explained with the following example. For instance, as shown in the Figure 5.1, by selecting particular customer segment such as specific subgroup 'A', it can be identified that the customer is buying the same amount of quantity of products for different prices. In this way it can be traced for other groups. In addition, based on this buying behavior of the customer group it will be easier for wholesaler to investigate other parameters. For example, the most sold product groups and an average sales per business sector.

Firstly, the average sales per business sector is shown in the bottom left block (Figure 5.1). This is measured based on the average invoice amount for each business sectors per quarter. The drill down function in this graph shows the average sales per business sector for a particular customer group. Secondly, the highest sold product groups graph has been shown in the right

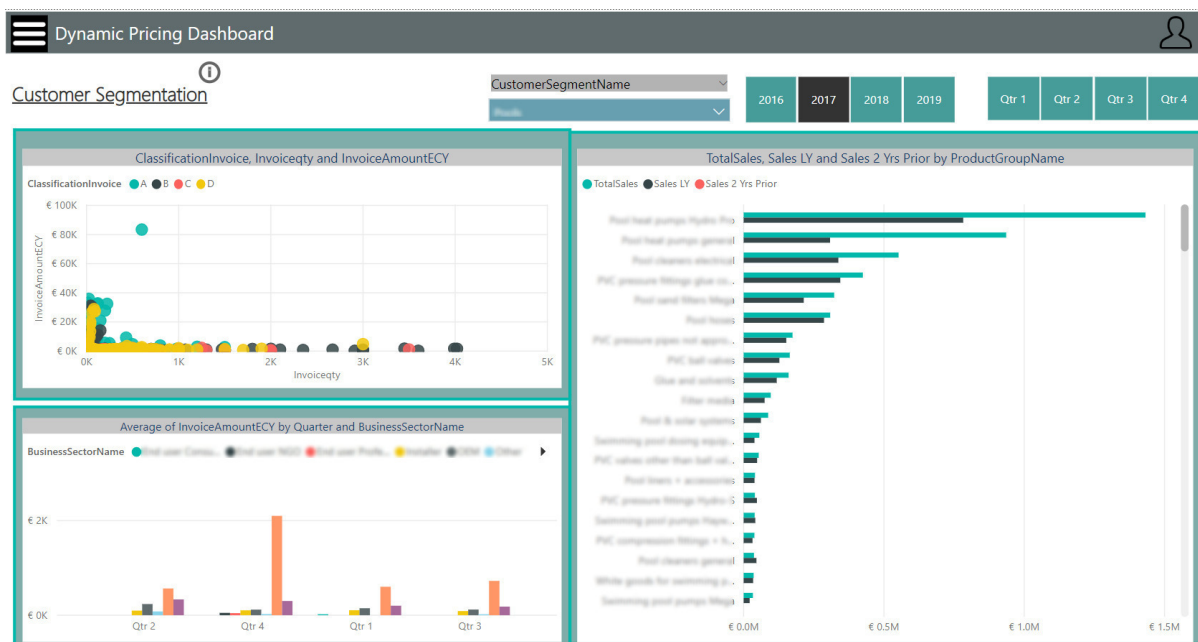


Figure 5.1: Customer Segmentation

block of the Figure 5.1. For a specific customer group this graph will identify the highest sold product group. This is calculated based on the total sales (i.e. sum of Invoice Amount) which shows the comparison of sales for current year, last year and two years prior. Furthermore, this graph also provides the drill down function to understand each product in the product group.

If the data set does not provide the grouped customers then it can be determined based on the k-means clustering. Firstly, determine the customer groups by defining the two or more numerical variables (Bangerta, 2010). Next, provide the labels to be shown on top of each observation. Lastly, define the number of output clusters by grouping with ID or product name. After segmenting the customers to different groups, it is very important to learn about how they value the various product attributes and/or service(s) in relation to the price, which is explained in the next Section 5.2.

5.2 Customer Value

Customer value is the second page of the dashboard which represents the price elasticity and revenue. Firstly, it recommends to convert from red ocean to blue ocean strategy. This is because, in red ocean strategy competitiveness between the companies will lead the companies to compare with their competitor's prices. Subsequently, companies will settle for low price in order to increase the demand and this will result into lower profits. In addition, competitors' prices are not transparent for wholesale companies, they tried to keep their customers by providing discount and competing with the other companies, but this is not profitable for the

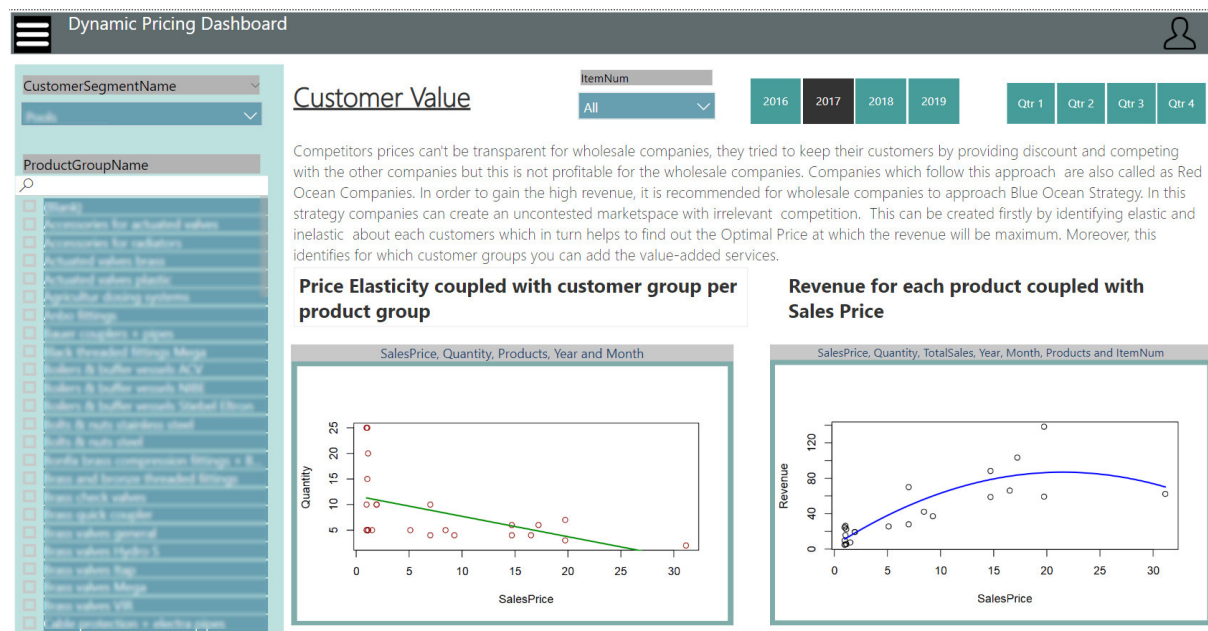


Figure 5.2: Customer Value

wholesale companies. Therefore, this dashboard suggests to convert it to blue ocean strategy. In a blue ocean strategy the competition is irrelevant and with value-added services companies can increase their demand even by setting it to a higher price.

Secondly, the demand or price elasticity (how responsive sales are in respect to price changes) coupled with customer group and product group is identified. In addition, the elasticity can also be measured per product. The simple mathematical model (Linear Regression¹) has been implemented to calculate the price elasticity. Previously mentioned linear equation (4.1) has been used to calculate the elasticity model where Y-axis is Quantity ($Q(p)$) and X-axis is Sales Price (p) as shown in the above Figure 5.2. In addition, it also shows that for specific customer groups or per product, the demand curve is elastic.

Besides that, this model will also help to identify the leading products which are also termed as Key Value Items (Section 2.1.1). BenMark et al. (2017) state that these products are leading in the buying behavior of the customers and whose prices consumers tend to remember. If the product fit the elasticity model, it can be considered a leading product. If it does not fit the elasticity module, it can also be considered a lead product. Lead products could be the complementary products whose prices consumers don't tend to notice and remember.

Moreover, the linear elasticity model can be improved to the logistic model with sigmoid demand curve as shown in the Figure 5.3. This model will help a manager to learn about the data

¹In statistics, it is used to find the linear approach and to build a relationship between dependent and independent variable

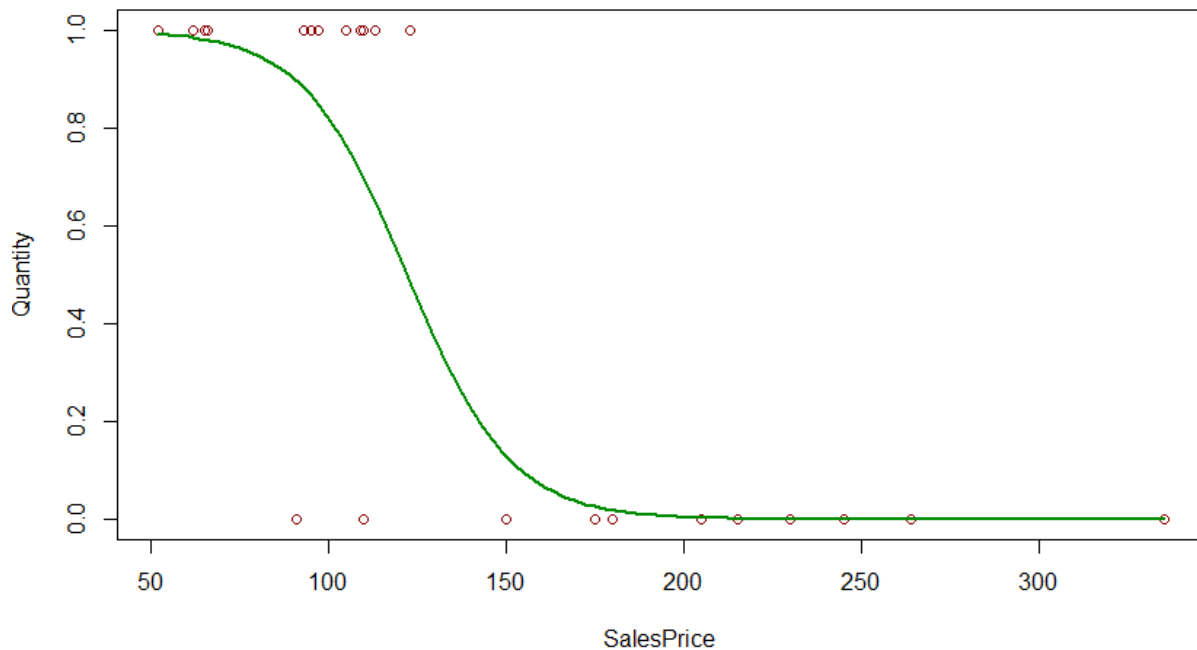


Figure 5.3: Sigmoid curve model

points which does lie on the linear line. Points that falls far above or below this curve can be termed as outlier. The outliers can be related to as promotions, advertisements etc. However, in this dashboard this model has not been defined yet. It will be inserted in the future research.

Thirdly, by identifying elasticity and inelasticity for each customer group or for per product, the (revenue) model suggests the optimal price at which the revenue will be maximum. In this dashboard, the revenue model is estimated based on the quadratic equation without intercept c (equation 4.3) where Y-axis is Revenue ($R(p)$) and X-axis is sales price (p).

Moreover, revenue models can also be referred as revenue management models during decision process of pricing. Having said that, according to Cooper et al. (2015) many business use Revenue management (RM) models to make operational pricing and availability decisions. These models do not explicitly account for the effects of competitors' decisions because even in settings with multiple competing sellers, each seller typically uses a model as though the seller is a monopolist. Specially, when making operational decisions sellers may consider competitive effects at a strategic level or may sometimes account for competition in an ad hoc manner. However, in many revenue management systems, competition is not explicitly modeled at the operational level. However, in particular if the model explicitly includes competition then that model is not considered as RM model in practice (Cooper et al., 2017). In addition, it is not considered that a decision making model is incorrect if most of the work is with or without a model of competition. Furthermore, it may be possible that there may not exist any values for

parameters needed to represent the resulting model. For instance, more often it is assumed that demand is a random variable with distribution that depends only on the current price of the seller, and not on previous prices of the seller (or on the prices of other sellers). Despite that, in many applications it is likely that demand depends on previous prices. For example, to forecast future prices, buyers may use previous prices, or they may exhibit behavioral traits such as the reference price effect.

Moreover, revenue models are used to make demand management decisions. Therefore, Karaesmen et al. (2008) have categorized these decisions into three types. Firstly, the mechanism that helps to decide about the selling format of products is called as the structural decision (such as suggested prices, negotiations). Secondly, the price decisions are the decisions which takes place during price setting across product categories, reserve prices (auctions) or to set an individual offer price. Lastly, the quantity decisions are about whether to accept or reject an offer to buy; how to allocate output to different segments, products or channels; when to withhold a product from the market and sale at later points in time. However, these decisions vary according to the business context of the firm. Besides that, from the above-mentioned models a wholesaler can decide to set their prices based on the suggested optimal price at which the revenue or profit will be maximum.

Overall, these decisions and models will help to create a blue ocean strategy, where wholesalers can learn about their customers (for example, what is a unique offering) or search for a customer group that will no longer like the old value proposition. This way, it will be easier to create a new value propositions or to add other value propositions (touchpoints) which suits to the customers. The following section briefly explains about the touchpoints.

5.3 Touchpoints

The Digital revolution is reshaping the customer experience in almost every sector. Digital attackers are entering the market by setting a high bar for simplicity, personalization and interactivity which radically offers new ways that companies can interact with their customers (Chheda et al., 2017). In addition, for a good communication and transaction with customers, Saghiri et al. (2017) mentions that many authors (e.g. Chheda et al., 2017; Stein et al., 2016; Voorhees et al., 2017) have tried to address the wide range of touchpoints and communication channels. Besides that, Baxendale et al. (2015) also provides a holistic view of the channels' structure which addresses the relationship between different demand touchpoints and brand considerations.

Firstly, to reinvent the customer experience Chheda et al. (2017) suggests capturing a new source of customer value. This can be started with in depth data analysis insights about what

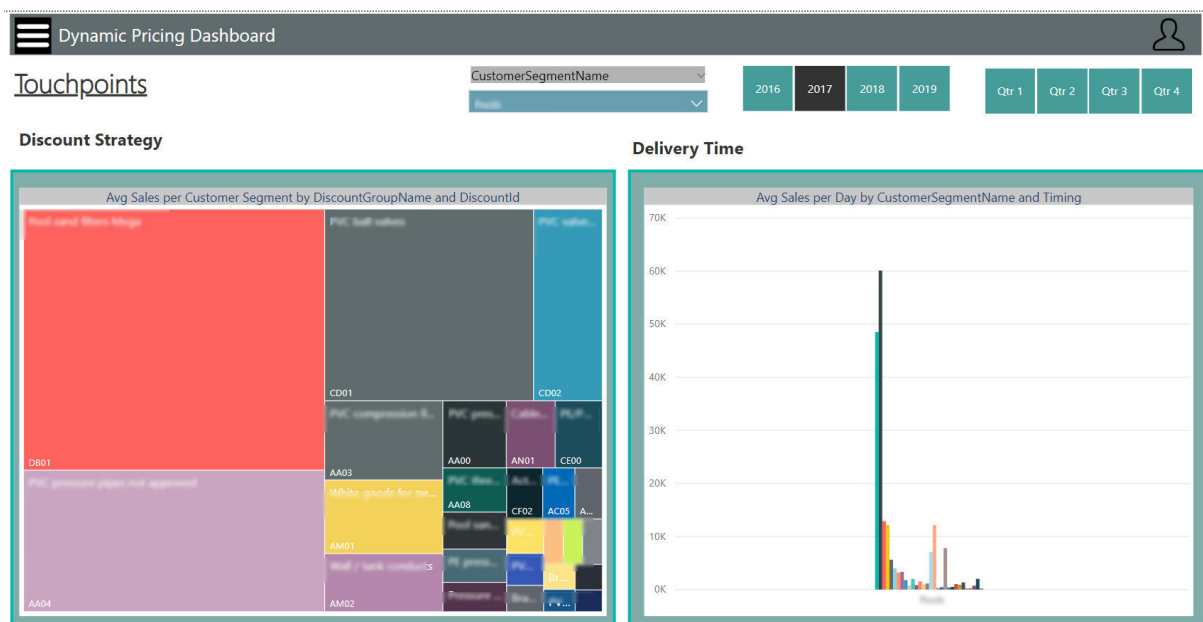


Figure 5.4: Touchpoints

really matters to customers and how best it can be delivered to them. In other words, a complete understanding of a customer journey that cuts across multiple functions and channels. However, most of the companies fail to capture an understanding of their customers' behaviors. For the reason that, they focus only on optimizing individual touchpoints rather than tackling the customer experience over their whole journey as how actually the customer experience it. Moreover, most research focuses only on parts of the customer journey in isolation such as brand advertising, in-store communications but it needs to be understood across all touchpoints. Furthermore, in order to have a complete marketing plan, managers show an interest in understanding the comparative effects of diverse touchpoints in an equivalent manner (Baxendale et al., 2015).

Secondly, Stein & Ramaseshan.(2016) defines touchpoints as a customer journey across multiple channels and at various points of time customers have different experience when they 'touch' any part of the product, service or organization. This connection between the customer and any part of the company is termed as touchpoints. Thirdly, Voorhees et al. (2017) also defines a touchpoint as a service provider that facilitates the service encounter to create customer interactions. However, touchpoints might not be linked directly to a company. They might also emerge during unplanned interactions with representatives of company's products, services or brands (Meyer and Schwager, 2007). From this perspective it can be considered that touchpoints occur at all stages of the customer journey including the extra value service to improve the value proposition. In addition, touchpoints can also be made from varying combinations such as advertisements, help desks, quotes or discount strategy. Lastly, it can be said that touchpoints are defined to understand the customer journey behind each internal processes of the company (Section 4.2).

Therefore, in the third page of the dashboard, from the customer perspective and from the limited data source only two touchpoints are defined. Firstly, in the top left block Figure 5.4 touchpoint Discount Strategy is represented. Each sub block in the graph is classified based on discount id and discount group name to calculate the average sales for the selected customer group. The next touchpoint is the Delivery Time which is shown in the top right block. This is identified based on the average sales per day for specific customer group by subtracting ordered day from delivered day. This touchpoint helps to find out which customer group is willing to pay higher price if the product is delivered on the same day. Also, in these touchpoints the responsibility of an employee plays an important role to understand the customer journey. Due to data limitation, the graphs related to employees have been not shown in this dashboard.

5.4 Price Optimization

As mentioned in the Section 4.4, the price optimization is used to measure different financial terms such as gross margin, sales margin, profit margin etc. According to Harvard Business article Phillips, (2005) pointed out that based on the price optimizations some of the retailers are achieving gains in gross margin in 5 to 15 %. Therefore, in the fourth page of the dashboard gross margin per product and, sales and profit margin per distributed channel has been presented.

Many studies have pointed out that gross margin management plays a vital role in the growth of the company (Stasz, 2003; O'Mara, 2015). Despite that the company is selling more than a year before, the profits can still drop. This is because the gross margin lies behind the declination of the profit. Moreover, company's growth is measured from both gross margin and profit margin because both the terms reflect on what company earns from its sales. Profit margin shows as a percentage which is the difference between net sales and cost of goods sold which illustrates how well the company uses its resources. In calculating profit margin, other costs such as fixed costs as overhead, interest, taxes etc. are included. The gross margin is calculated with difference between sales price and cost price which is multiplied with the total amount of goods sold. In addition, this dashboard also suggests the optimal price at which the gross margin will be maximum. The gross margin model is shown in the top left block of the diagram 5.5. This is implemented by a quadratic equation with intercept (4.4 and 4.5) where Y-axis is Gross Margin ($G(p)$) and X-axis is Sales Price. When gross margin is growing it illustrates growing sales and better use of resources (Voorhees et al., 2017).

As said by Voorhees et al. (2017) the gross margin has more importance in the growth of the company. However, it might be very difficult for company to make a net profit if the business does not make a decent gross margin from per products (Hirst 2013). Gross margin can be

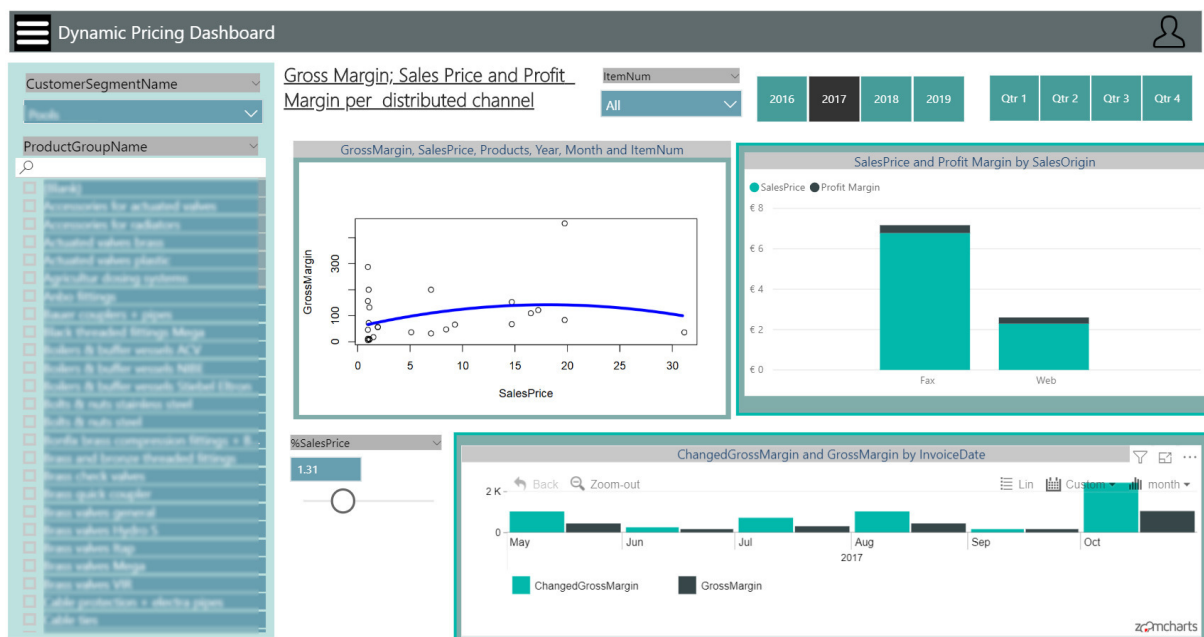


Figure 5.5: Price Optimization

defined as both gross margin in euros and gross margin in percentage. In this dashboard gross margin is represented in euros. In addition, gross margin is used to measure how much a company gains from total sales revenue after the production costs associated with purchasing, producing, sorting and transporting the product. The company gains more from each euro of sales towards its other costs if there is improvement in the gross margin (Investopedia 2015).

Besides measuring the maximum gross margin, there are also other parameters which are presented in this dashboard. For example, if the manager of a company would like to look for the effect on the gross margin by changing the sales price in percentage, then this prototype shows the effect on the changed gross margin (i.e. shown in bottom right block of Figure 5.5). On the top right block Sales Price and Profit margin per distributed channel is shown. Due to limited data, Profit margin is calculated only per distributed channel. However, it can also be measured based on other parameters such as geographical area.

Overall, to sum up the dashboard the overview page is shown (Figure 5.6). In this overview page, different parameters like Total Sales, Total Items, %Sales Growth, Total Profit and Last sales date have been calculated. As the dashboard is mainly following the value-based pricing which represents specifically to the customer added value services. Therefore, this page also shows the overall calculation related to customers. For example, average sales per customer group for each year; total profits per business sector and total profit per day this year versus last year.

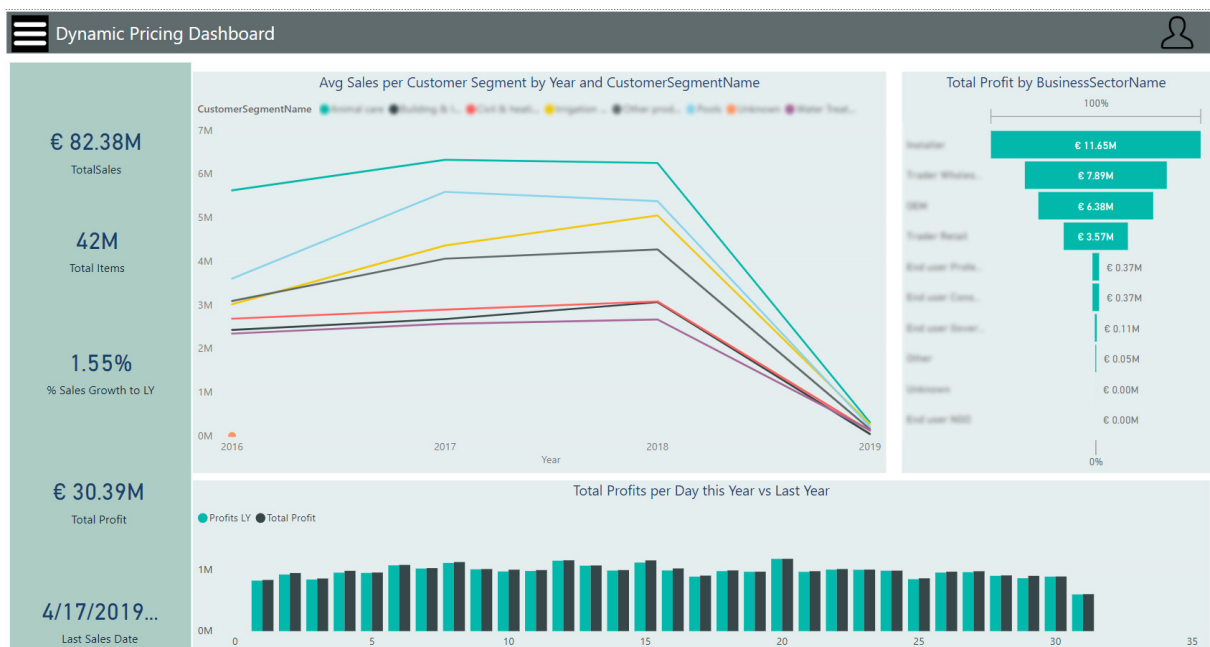


Figure 5.6: Overview

Chapter 6

Evaluation

In this chapter the process of evaluation is described, starting with the set-up for the evaluation and ending with the feedback from the interviewees.

6.1 Setup

Six evaluation processes were conducted with the same six interviewees who were interviewed in the earlier phase. Again, the same procedure took place to contact the interviewees. The main purpose of the second interview was to ensure and verify that the dashboard is designed according to company's requirements and to know their satisfaction about the dashboard. In order to demonstrate the demo of the dashboard we set up each interview via Skype for Business call and Google Hangouts call. However, we faced some issues in setting up these calls because most of the companies do not use the skype for their video conference calls.

Moreover, the Van Egmont Group (a wholesale company) does not use any video conference call. Therefore, the evaluation with the pricing director from Van Egmont Group (a wholesale company) was conducted during a pricing event in Rotterdam. The other evaluations were conducted with the same pricing managers and business analysts who were interviewed in the earlier stage. The overview list of companies and the role of interviewees are provided in Appendix B.1.1.

The evaluation process itself was conducted with one interviewer, alternating between explaining the model and clarifying interviewees doubts, to avoid missing information. Firstly, the background information of the framework and model are presented via the presentation slides. Later, the demo of the dashboard is shown. In addition, for the second interview the same approach is applied as the first interview. Therefore, the interview was conducted in semi-structured nature, to give freedom in guiding the conversation and not limiting the expressiveness of the interviewee.

6.2 Questions Setup for Evaluation

Based on the prototype and design rules, the evaluation questions were setup and this process was conducted over the video conference call. To make it easier for interviewees to evaluate and to assess in short amount of time, only the five most important questions were setup for this process. The questions were divided mainly into two sets, open and closed questions. Moreover, inclusion of both types of questions in the evaluation process helps to learn unexpected and important things (Farrell, 2016). With these types of questions, interviewees were asked to answer based on their experience how dynamic pricing dashboard will be useful to them. The questions for each set is provided in the Appendix E.1.

- *Open Questions* these type of questions were setup to know the usability of the dashboard and their overall impression about the information. The questions were framed like this type because it allows interviewee to give free form of answers.
- *Closed Questions* these types of questions were setup to understand the usefulness of functionalities of the dashboard which have a limited set of possible answers. For instance, whether to include the functionalities (such as segmentation, elasticity etc) on the dynamic pricing dashboard.

6.3 Evaluation Results

This section summarizes the evaluation results of the dynamic pricing dashboard based on the feedback received from the interviewees. The results are divided into two sub-sections qualitative and quantitative results. The qualitative results are from open-end questions and quantitative results are from closed-end questions. This is because, in order to understand whether the dashboard will be helpful in all the perspectives of the company. Six experts relating to this field were interviewed during this phase. The detailed overview of the experts and answers provided in the Appendix E.2.

6.3.1 Qualitative Results

The process of pricing information

In this study, the designed dynamic pricing dashboard represents the price decision making for wholesale companies. For that reason, interviewees were interviewed for the second time to

evaluate whether they find the process of pricing information useful. All the interviewees found that the provided information on the process of pricing will be very useful for their companies. Besides that, one of the interviewees also mentioned that it is very useful for wholesale companies in understanding the pricing strategy with four different perspectives. They also mentioned that this level of information in pricing is relevant and suitable for their company. One respondent said that not all the information will be relevant because it depends on the specific market dynamics. Moreover, they were also asked the question about if they miss any information on the dashboard. Most of the respondents replied that they did not miss any information. However, on a specific level two respondents said that they miss some of the information on the dashboard. One interviewee mentioned that the dashboard is missing the peer-comparison. For example, when analyzing a year, the interviewee would prefer to verify either by year or by month etc. In addition, the other interviewee mentioned that dashboard is missing import and export data status. However, this information is not shown on the dashboard due to limited data. Moreover, these are the general requirements which differs for each company.

Furthermore, the interviewees were evaluated about the benefits and drawbacks of the dashboard with respect to price decision making. Based on the response received from the interviewees the below points give some insights about the pros and cons of the prototype.

Benefits

- The combination of dynamic pricing strategy framework with four different perspective is valuable. This way a holistic approach of wholesale pricing is enabled.
- It gives a good overview with sufficient flexibility to manage pricing issues within a company.
- This dashboard is a good starting point for wholesale companies in price decision making.
- Advantage is that we have a lot of information in a clear, summarized overview.
- It is more beneficial that a customer-added value dashboard which also identifies the key value items.

Limitations

- In this study, transforming information from a dashboard into price setting a software is not taking place. Therefore, it is limited while updating and setting price for millions of articles.
- Sometimes calculations over the whole product group, with a wide spread of sales prices in, might lead to wrong conclusions.
- The dashboard still requires a high level of data literacy.

All in all, it can be stated that the dashboard provides the detailed information of pricing with the different perspectives is more beneficial for wholesale companies. However, the drawback of this dashboard is that, it is not shown how it can link to the price processing software, where

a manager can directly change the price directly in their software. Despite that, the aim of this study is mainly focused on the decision process of pricing. Therefore, the main advantage of this dashboard is that it provides the framework which helps wholesale companies in price decision making. Moreover, the framework not only provides the structure for decision rules but also the models that calculates the optimal price.

6.3.2 Quantitative Results

Functionalities of the dashboard

In this dashboard functionalities plays an important role in suggesting the optimal price for the company. The functionalities described in this dashboard are nothing but the functions which are used to define each perspective. Moreover, these functions are requirements of an interviewee which incorporates the pricing information on the dashboard. For example, segmentation, price elasticity, revenue, touchpoints (discount strategy, delivery time), gross margin, sales margin per distributed channel and percentage sales price. The interviewees were asked to evaluate whether they find these functionalities are essential, nice to have or too much information to show it on the dashboard. Accordingly, based on the answers from the respondents (as shown in the below Figure 6.1) it can be said that customer segmentation is the most essential functionality in this dashboard. This is because, all the interviewees found it as the most relevant function. Moreover, according to interviewees price elasticity and revenue also plays an important role in dynamic pricing dashboard. Therefore, these two functions are also crucial for the dynamic pricing dashboard. One interviewee responded that elasticity and revenue are not that relevant, but it is good to show it on the dashboard for price decision making.

The respondents found that gross margin and sales margin per distributed channel are also one of the essential functionalities. These two functions have the mixed responses where two of the interviewees find it as nice to have on the dashboard. In addition, at the same time they also find it as too much information to show on the dashboard. Besides that, the percentage sales price is the function where a user can check the change in the gross margin by increasing or decreasing the percentage sales price. For this function, three respondents found that this is the most essential function to show on the pricing dashboard. However, the other three respondents do not find it as relevant function, but it is good to be present on the dashboard. In addition, the response results for the touchpoint: discount strategy function is similar to the above-mentioned functions.

Furthermore, only one respondent found touchpoint: delivery time as the important function. Besides that, three respondents did not find it as an essential function. However, they mentioned that it is good to use it for decision making. In addition, two of the respondents said that it is not essential function or too much information for decision process. All most all the interviewees did not miss any functions. However, one interviewee mentioned that there is dif-

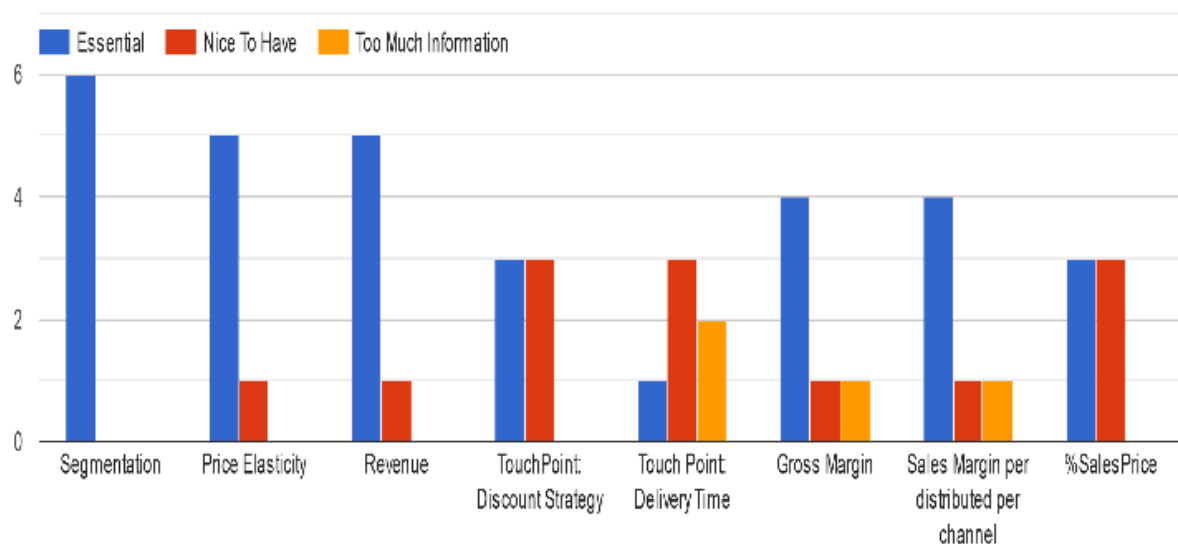


Figure 6.1: Overview results of evaluation on functionalities

ferentiation required in changing prices of items for product group because the item volumes react to each other.

Overall, it can be concluded that the interviewees were very impressed by the result and demo of the dashboard. One interviewee mentioned that this dashboard is a good starting point for further development in price decision making and helps to sharpen the definitions. Besides that, the other interviewee was impressed by the fact that applying the holistic and theoretical approach into a practical case in a short period of time. In addition, the interviewees also mentioned that it is a well-designed and elaborated dashboard which calculates the optimum price to manage the pricing issues. However, the interviewees have also recommended some of the below points to consider for further development of the dashboard.

Interviewees suggestions for further development of the dashboard

- The price change on product A has an impact on the volume change of product A and B (cannibalization or complementary product). Therefore, this has to be taken care of when changing the price of one product.
- Perhaps a couple of use cases can help optimize the dashboard. For example, a use case could be what promotion price should be considered for penetration strategy, or which assortment is continuously under performing. Solving these use cases with the

dashboard will test the practical use in the company.

- Implementation of the dashboard in the current business of the company to change the optimal price directly on the price setting software.

The above mentioned points are considered for the future research work. Moreover, the models that can be implemented in order to improve the dashboard are discussed in the next section.

Chapter 7

Conclusions and Discussions

The main objective of the study was to design a dynamic pricing dashboard that helps wholesale companies to improve their decision process of pricing. In order to do so, this study defines the design rules as well as present simple mathematical models that can be used in price decision making. This chapter summarizes the overall findings from this study by answering research questions. Besides that, key values identified from this thesis are discussed and also this section suggests the work for future research.

7.1 Conclusions

1. *Which different pricing strategies exist? and which methods, functionalities and techniques are currently available to support these strategies?*

In this thesis, a comparison between different pricing strategies, methods and techniques is performed using the existing available literature. Besides that, newly gathered data from the recently published articles and from pricing seminars are represented.

From the identified strategies found in literature, the most promising strategy the wholesale company representatives preferred was value-based pricing. This is because in this strategy the prices of products or services are set according to customers' perception. This can be determined by customers' willingness to pay and Key Value Items (KVIs). Moreover, the inclusion of KVI module in the pricing strategy could help a wholesaler and retailers to improve their customer price perception profitably. Furthermore, the key value items (KVIs) help to differentiate the leading products. In order to identify these products, we found that it is good to define the price elasticity and revenue by using simple regression models.

However, we also found that the value-based pricing strategy is more beneficial than the other

pricing strategies. Firstly, in cost-based pricing strategy, data which is required to set prices can be easily set. Despite that it will not consider the aspects of customers willingness to pay and price elasticity. In other words, it is simple to set the prices without any market research or data analysis by adding a certain margin on top of the company's costs as pure profit. Despite that, Campbell (2019) says that there is a big problem with the cost-based pricing because "Customers don't care about the cost, they care about the value". For example, the unit cost of delivering one account can be very low in SaaS companies. Here the value of the customers matters that they get out of using the product not the company's payment to their developers.

Secondly, in the competitive based pricing strategy, competitive situation is taken into account where companies set their prices on the competitor's price. For retail companies, the competitor's data are easily available but it's not transparent for wholesale companies. In addition, companies do not set their prices based on company costs or customer value. For example, instead of focusing on what a company can offer to the potential customer or putting together right features with the right price, the company will be offering something that the customers can get somewhere else (from their competitors).

In addition, the other identified strategies such as micro-marketing and algorithmic pricing also play key roles in adding value for customers. In micro-marketing strategy, determining the price elasticity for small customer groups or individual customers will help the retailer to understand the different market characteristics. Besides that, with this strategy the elasticities are defined based on the product life-cycle phase which supports to attract price sensitive customers. Moreover, algorithmic pricing assists to set the optimal prices based on these price sensitive customers. Currently, Amazon is leading the market and it appears that their market has potential in B2B as large as that of a B2C market. However, one disadvantage of algorithmic pricing is that it is challenging to implement in traditional retail markets. This might be because of the limited data or manually changing the prices for products.

As mentioned earlier the most suitable methods to determine the price elasticity are using linear regression analysis methods. In addition, Bayesian methods can also be used to measure price elasticity specifically in combination with the sales promotion effects.

2. What are the desired pricing strategy objectives of the wholesale companies? and which problems are experienced in fulfilling these objectives?

From the identified literature papers, it has been found that the research on dynamic pricing is more focused on retail companies than on wholesale companies. Therefore, in order to understand the current situation of the wholesale companies, seven interviews were conducted with six different companies. The list of the companies and the details of the interviewees is provided in the Appendix B.

Currently, from the interviewed companies we recognized that their main pricing strategy is either competitive based pricing or cost-based pricing, or a mix of all pricing strategy whereas, only one or two companies are following the value-based pricing. For one company, approach of mixing pricing strategies has led to a decline in their gross margin. However, the companies which are following a different approach would like to focus on value-based pricing; because they would like to make their customers understand about the value-added services, and to understand their customer behavior on price changes. All these companies' sales are from different types of products such as agriculturally based products, MRO articles, electronic products, pipeline products.

The process of pricing differs for each company. Besides that, in dynamic pricing the word dynamics itself is defined as diverse. For example, some of the companies are very dynamic in the process of their pricing where they change their prices on daily basis or six times in a month, while some companies would like to set their prices once a year.

Next to this, from the interview results the most identified and required feature to be included on the dashboard is price elasticity and price sensitivity. Additionally, they would also require suggestions on discount per customer group for different types of products. Moreover, the other feature to include on the dashboard is comparison with their competitors when the company updates a new product.

Overall, it can be concluded that most of the mentioned pricing strategies and methods are still being used today, although some are not helpful to the company to increase their profit margin.

3. What are the suitable principles to guide the design of a dashboard for proper decision process of pricing and to add value to customer?

Based on the literature review and interviews it's been identified that companies are facing difficulties in price decision making mainly in applying the right pricing strategy. Therefore, in order to improve in the company's decision process of pricing, the design rules have been defined. These design rules incorporate the requirements of interviewees about pricing information on dynamic pricing dashboard. Besides that, according to Ceresia et al. (2010) and Rigby et al. (2015) study, we found that Balanced Scorecard (BSC) Framework is most suitable to define the design rules. The framework is designed with four perspectives. In this thesis, these perspectives adopt a dynamic pricing strategy to define the desired objectives. In addition, these objectives fulfill the wholesale company's requirements. Firstly, the customer perspective is defined in order to understand the customer buying behavior. This can be determined by applying segmentation rule for customers and products.

Secondly, after grouping the customers into different clusters, it is advised to learn about each customer group (e.g., determining the customer value i.e. product or service in relation to the price). This can be achieved firstly by understanding under which strategy (red or blue ocean) the company exists for all. The company which has a traditional way of marketing, where competition is relevant is defined as red oceans. On the other hand, the company which creates and captures the new demand in market space are termed as blue oceans. Companies following a red ocean strategy are advised to convert to a blue ocean strategy, according to Kim and Mauborgne (2005), and Burke et al. (2016). This is because in a red ocean, the companies rival each other to set low prices due to highly competitive environment which results in less profit. However, by applying the blue ocean strategy, companies can set their prices higher because this strategy creates uncontested market space with irrelevant competition. Moreover, by learning in such a way makes it easier to determine the price elasticity and revenue for a specific customer group or product group.

Thirdly, in internal process perspective, understanding the customer journey plays an important role. To add extra value-added services to the identified and potential customers, it is very important to learn more about each touchpoint of the customer journey. E.g. discount strategy, promotions, service and delivery etc. Moreover, the role of an employee in these touchpoints is also vital. By learning about all the parameters from three defined perspectives at last the gross margin or the sales margin per distributed channel can be optimized in the financial perspective.

4. How can these principles be incorporated in a dashboard?

Based on the above-mentioned principles, the dynamic pricing dashboard was designed. It incorporates the requirements of the interviewees. In the dashboard, decision process has been shown in four different pages and one overview page. The first page represents the customer perspective which provides techniques to segment the customer groups, product groups to find customer's buying behavior. The second page represents the learning and growth perspective. This page enables managers to learn about their marketing strategy (such as red and blue ocean strategy). Besides that, this way of learning makes it easier to measure the pricing models. For example, determining the price elasticity coupled with customer group or product group and estimating the optimal price at which revenue will be maximum. In addition, if the product fits the pricing models then it can be assumed that it is a key value item (i.e. leading product).

The third page represents the internal process perspective. To add extra value- proposition to the customer groups the touchpoints are defined in this page. These touchpoints are successful in defining other variables such as discount strategy, delivery time. Besides that, Gross margin plays an important role in financial growth of the company. Therefore, the fourth page represents the Financial Perspective. This page predicts the optimal price at which the gross

margin will be maximum. The pricing parameters such as profit margin and % sales price change functions can also be incorporated in this page. Lastly, the overview page represents the other pricing parameters. For example, Total Items, Average sales per customer segments.

5. *How well does the design meet the requirements of the wholesale companies?*

Based on the first interview we found that the main requirements of the wholesale companies were as follows.

- The dashboard should be helpful in understanding the customer behavior. Moreover, it should represent the pricing strategy to come up with separate product ranges.
- It should benchmark product group or customer group to perform a price elasticity, sales and gross margin.
- The change in price should show the effect on the price setting platform.
- It should represent other parameters such as discount strategy, seasonality per product and wholesale quotation from brokers.

In order to incorporate these requirements, the dashboard was designed and developed. In addition, to meet these requirements an evaluation process was conducted with the same managers of the wholesale companies. For the evaluation process the dashboard was used as a prototype and to have concrete feedback. Based on the evaluation results it can be said the dashboard has achieved to cover almost all the requirements of the wholesale companies (Section 3.3.5).

- Firstly, it has achieved to provide a clear summarized overview which makes easier for marketers to understand.
- Secondly, it provides a framework that combines four perspectives with dynamic pricing strategy. These perspectives cover the above-mentioned requirements by the wholesale companies. The first perspective defines the customer behavior based on the segmentation rule. The second perspective measures the price elasticity and revenue coupled with customer group and product group. The third perspective defines the touchpoints such as discount strategy and deliver time. The fourth perspective measures the sale and gross margin. In addition, it also represents the percentage sales price which shows the price change effect.
- Most importantly, it not only suggests how the decision should take place but also predicts the optimal price at which revenue and gross margin will be maximized.
- Lastly, it also identifies the key value items.

Furthermore, it is more useful in managing the pricing issues within a wholesale company. Moreover, the framework provides theoretical and holistic approach which is a good starting point for price decision making. Therefore, it is recommended for wholesale companies to approach the value-based pricing strategy with the design rules as proposed earlier (Chapter 4).

This is because it is a more valuable pricing strategy than any other pricing strategy to come up with the profitable output.

However, due to limited data this design did not achieve to cover all the requirements. The below list provides those requirements.

- Some of the functions such as promotion price and seasonality are not covered in this dashboard.
- Besides that, this study limits the setting of the price directly in the company's pricing software.
- The dashboard still requires a relatively high level of data literacy. Without this, a use may come to wrong conclusions. The price change over whole product group, with widespread of sales price in may effect on quantities of different products. For example, change in price of product A can influence the quantity of product B.

In order to cover the above-mentioned points and to develop a price setting platform, the next section outlines the key findings of such mechanisms.

7.2 Discussion

The most important findings of this research and the contributions are discussed in this section

7.2.1 Key Values

By using thorough and extensive literature studies, the interviews were set up with six managers of wholesale companies to obtain the requirements of dynamic pricing on the dashboard. Based on the requirements and with a suitable framework the dashboard has been designed. As mentioned in the previous page (67), this dashboard has achieved to fulfill most of the requirements of the interviewees. However, in order to cover all the requirements, the design of the dashboard has to be extended with a high level of data literacy. For example, suggestion on price change on item group level can impact the volume of other items. This means the model has to be developed in such a way that it should also suggest the quantity to sell for the recommended optimal price. In addition, this dashboard limits transforming information directly to a price setting platform. Therefore, this section discusses some of the key models that can be applied to improve the data literacy and to change the suggested price dynamically in the system.

Multi-agent models

In a complex economic market system, all the members adaptively interact with each other to make the right decisions. Moreover, decision making in dynamic pricing is not only applicable

to retailers but also wholesale companies. Due to this, a pricing system requires both micro and macro level of thinking in multi actor market (Diao et al., 2011). Moreover, to solve the real-world problems the major challenge would be to develop a new technique in the area of global market. However, any firm can be economically visible by improvising in their customer services or by minimizing total investment (Madureira et al., 2005). Therefore, in this section some of the multi-agent models are discussed to set prices based on market conditions.

According to Madureira et al. (2005) multi-agent model is the most suitable approach to improve in any economy of the world. This is because, these types of models can easily respond to the organization needs. For example, it can contribute in setting the prices that handles supply and demand markets under different prices and conditions. An agent is a virtual or physical autonomous entity that performs a task according to the changes in the circumstances to yield the intended result. Moreover, because of its distributed and dynamic nature it can build a flexible, complex and cost-effective scheduling systems. On the other hand, Diao et al. (2011) also propose a new method to solve complex problems, which is called agent-based modelling and simulation (ABMS). In this model the individual characteristics and their behavior can be built using the bottom-up approach. ABMS is an effective way of studying innovation diffusion which maps and simulates between the agent to interact and coordinate. ABMS can also contribute to three factors; firstly, the heterogeneous behavioral subjects in the market (such as consumers, wholesalers, retailers, manufacturers and so on).

Secondly, adapting the updated information changes the individual behavioral acceptance. These changes might cause emergent phenomena on nonlinear interactive behaviors such as price, quantity, ads and so on. Moreover, when price changes in different scenarios the ABMS model can dynamically establish a market situation. In an artificial market this model can be used to conduct various experiments by changing parameters. Moreover, to identify how a real market would respond to a certain event and to predict the evolution of the market (Diao et al., 2011). In addition, Fortmann (2014) says that ABMS is one of the three modeling approaches (System Dynamics and Imperative programming) that are integrated in Insight Maker tool. It is an advanced simulation modelling tool that supports graphical model construction using multiple paradigms. Besides that, this tool also provides an interface that is implemented directly in client-side code and which runs on user's machines.

Furthermore, there are other multi-agent models which have been built especially for concurrent marketing analysis (CMA). Schwartz, D. G. (2000) develops such a multi-agent model which is the system that provides suitable interaction context and provides unconstrained use of individual agents. This model is mainly built for marketing managers to solve their decision problems by conducting concurrent and interrelated analysis. For example, through this model decision makers can communicate through a common memory called blackboard. The blackboard is an agent-based system architecture which includes the interdependence of basic marketing factors such as price, place, product and promotion. Besides that, the CMA model represents

the diversity in different structure and semantics of each decision maker's knowledge.

Moreover, Bai et al. (2018) proposes to consider the on-demand service platform to serve price sensitive customers with heterogeneous valuation of the service. This platform charges the price for the customers and pays wages to their independent providers. This is because, supply and demand are endogenously dependent on the price and wage of the platform. A time performance-based queuing model can be considered to coordinate both supply and demand. This results into characterize the optimal price and wage that increases the profit of the platform. According to Taylor, (2018) on demand platforms will impact on the delay sensitivity of the customers and agent independence. Delay sensitivity means reducing the expected utility for customers and agents. Which suggests the platform to encourage the participation of customers by decreasing the price and to encourage the participation of agents by increasing the wage. Without any uncertainty in the customers valuation or the agents costs the intuitive price and wages are valid for benchmark setting. In addition, Bai et al. (2018) also found the similar results that when demand increases it is optimal for the platform to change the optimal price and to offer a higher payout ratio (i.e. the ratio of the wage over the price). From both the models that is price setting with uncertainty (Taylor, T.A, 2018) and without uncertainty (Bai et al., 2018) provides the same result. Therefore, it can be concluded that, the increase in demand, makes customers more sensitive to the waiting time.

7.2.2 Contributions

This research makes the following contributions to the wholesale companies in the field of dynamic pricing.

Firstly, it provides the knowledge of different pricing strategies, methods and approaches. Besides that, the requirements concerning the pricing managers to be shown on the dashboard are mentioned. Based on the literature studies and requirements, this study provides the framework for decision process of pricing. The literature related to designing dynamic pricing dashboard is still limited and strongly lacks the price decision making. To best of our knowledge, no such framework is available for wholesale companies. That is, designed and combined with the different perspective of the company and the dynamic pricing strategy.

In addition, the results from this study showed that the designed framework and the proposed pricing strategy will be of real use to the wholesale companies. This study not only provides the framework but also defines the simple models to calculate the optimal price using the price elasticity, revenue and gross margin. The models are calculated using linear and quadratic equations. These equations make it easier for managers to understand the logic behind the models. Moreover, this study also discusses some of the price setting platforms that can be

used in the future research. Therefore, both wholesalers and researchers can use this study as benchmark not only to improve in their decision process of pricing but also to use the simple mathematical model to find the optimal price.

7.3 Suggestions for Future Work

Verifying the literature on pricing strategies and its impact on customer behavior, methods, and techniques used for those strategies. Besides, verification of research in general, is of high importance. This is because, it could provide additional strength to current insights and possibly falsify other insights for specific contexts. In this thesis, very valuable information is obtained to design the dynamic pricing dashboard. Therefore, this section provides some of the main directions for the future research.

Firstly, the linear regression model which is used to calculate the price elasticity can be improved in the future work. This can be done with the logistic regression model (Fonseca, 2018). As explained in the Section 5.2, it is essential to estimate this model because it will be very beneficial to find the outliers. The outliers can be assumed as the data points which does not lie on the sigmoid curve (Figure 5.3). Besides that, it can also be assumed that these data points might be related to promotions or advertisements etc. Moreover, the estimation of this model will be able to even determine the suggestions provided from interviewees. For example, the volume impact of change of price in product A and product B. Therefore, in further improvement of the model, this point should be considered.

Secondly, this thesis has only studied the framework which suggests the optimal price at which the revenue or gross margin will be maximum. In order to use it in real cases and to guarantee the successful change in the price, the future research has to be taken care to integrate the dashboard with the current business of the company. In addition, with this integration a company will also be able to find the promotion price that can be considered for penetration strategy. Besides that, this will also be able to identify the under performing assortments. This future work is also recommended by one of the interviewees during this thesis.

Lastly, this thesis was not focused on designing the price setting platform rather it was more targeted to design the pricing dashboard that helps in decision process of pricing. Therefore, in this thesis the framework has been designed which defines the design rules in price decision making. However, the models which can be helpful in building the price setting platform are discussed in the previous Section (7.2.1). Accordingly, the scope of this research can be extended to develop such type of platforms to handle the supply and demand on markets, like auctions or exchanges.

Bibliography

- [1] Bages-Amat, A., Baker, W., Magnette, N., & Winkler, G. (2018). What really matters in B2B dynamic pricing. *McKinsey Marketing and Sales*.
- [2] Bai, J., So, K. C., Tang, C. S., Chen, X., & Wang, H. (2018). Coordinating supply and demand on an on-demand service platform with impatient customers. *Manufacturing & Service Operations Management*.
- [3] Baker, W. L., Marn, M. V., & Zawada, C. C. (2010). Building a better pricing infrastructure. *McKinsey Quarterly*, 1-6.
- [4] Bangert, P.D. (2010). *Client Segmentation in Wholesale Markets using Data Mining Client Mining*. Preprint.
- [5] Baxendale, S., Macdonald, E. K., & Wilson, H. N. (2015). The impact of different touch-points on brand consideration. *Journal of Retailing*, 91(2), 235-253.
- [6] Baye, M. R., Gatti, J. R. J., Kattuman, P., & Morgan, J. (2007). A dashboard for online pricing. *California Management Review*, 50(1), 202-216.
- [7] Benmark, G., Klapdor, S., Kullmann, M., & Sundararajan, R. (2017). How Retailers Can Drive Profitable Growth Through Dynamic Pricing. *McKinsey Marketing and Sales*. Retrieved from <https://www.mckinsey.com/industries/retail/our-insights/how-retailers-can-drive-profitable-growth-through-dynamic-pricing>.
- [8] Bijmolt, T. H., Heerde, H. J. V., & Pieters, R. G. (2005). New empirical generalizations on the determinants of price elasticity. *Journal of marketing research*, 42(2), 141-156.
- [9] Bolderdijk, J. W., van der Werff, E., & Steg, L. TVW. (2016). De psychologische effecten van prijsprikkels. *Journal of Transport Science Year,52*, ISSN: 1571-9227.
- [10] Bell, R., & McGladery (2011). How can customer segmentation help your Wholesale Distribution Business?. Retrieved from <https://www.erpsoftwareblog.com/2011/02/how-can-customer-segmentation-help-your-wholesale-distribution-business/>
- [11] Bunte.C, Sturz., S & Gmbh. O (2016) ELECTRICAL WHOLESALER STUDY 2016. How to successfully operate in a disruptive market by building a customer-centric wholesaler brand.
- [12] Burke, A., Van Stel, A., & Thurik, R. (2016). Testing the Validity of Blue Ocean Strategy

- versus Competitive Strategy: An Analysis of the Retail Industry. *International Review of Entrepreneurship*, 14(2).
- [13] Campbell, P. (2019, March). 3 Types of Pricing Strategy And Why You need Value-based Pricing. Retrieved from <https://www.priceintelligently.com/blog/value-based-pricing>
 - [14] Ceresia, F., & Montemaggiore, G. B. (2010, July). Applying the Goal Setting Practice in the Dynamic Balance Scorecard Learning and Growth Perspective. In *Proceeding of 2010 International System Dynamics Conference, Seoul, South Korea* (pp. 110-122).
 - [15] Chheda, S., Duncanand, E., & Roggenhofer, S. (2017). Putting customer experience at the heart of next-generation operating models. *Digital McKinsey*, March.
 - [16] Chen, L., Mislove, A., & Wilson, C. (2016, April). An empirical analysis of algorithmic pricing on amazon marketplace. In *Proceedings of the 25th international conference on world wide web* (pp. 1339-1349). International World Wide Web Conferences Steering Committee.
 - [17] Cooper, W. L., Homem-de-Mello, T., & Kleywegt, A. J. (2015). Learning and pricing with models that do not explicitly incorporate competition. *Operations research*, 63(1), 86-103.
 - [18] De Ruyter, K., Wetzels, M., Lemmink, J., & Mattson, J. (1997). The dynamics of the service delivery process: a value-based approach. *International journal of research in marketing*, 14(3), 231-243.
 - [19] Diao, J., Zhu, K., & Gao, Y. (2011). Agent-based simulation of durables dynamic pricing. *Systems Engineering Procedia*, 2, 205-212
 - [20] Farrell, S. (2016). Open-ended vs. closed-ended questions in user research. *Evidence-Based User Experience Research Training, and Consulting*. Retrieved from. <https://www.nngroup.com/articles/open-ended-questions/>
 - [21] Ferecatu Alina, (2018). Masterclass "The effect of Price fairness concerns on Price Discrimination", *Erasmus University Rotterdam*. Retrieved from <https://rsm.mediamission.nl/Mediasite/Play/25ac9ef48a5944449f9c2590a66b304c1d>
 - [22] Fonseca, Y. (2018). Different demand functions and optimal price estimation in R. Retrieved from <https://insightr.wordpress.com/2018/06/03/different-demand-functions-and-optimal-price-estimation>
 - [23] Fonseca, Y. (2017). Pricing Optimization: How to find the price that maximizes your profit. Retrieved from <https://www.r-bloggers.com/pricing-optimization-how-to-find-the-price-that-maximizes-your-profit/>
 - [24] Fortmann-Roe, S. (2014). Insight Maker: A general-purpose tool for web-based modeling & simulation. *Simulation Modelling Practice and Theory*, 47, 28-45.
 - [25] Gannholm, L. (2013). A Comparative Evaluation Between Two Design Solutions for an Information Dashboard.

- [26] K. Gowthami, M.R. Pavan Kumar (2017). Study on Business Intelligence Tools for Enterprise Dashboard Development. *International Research Journal of Engineering and Technology* (Vol 4).
- [27] Gupta, S., Lehmann, D. R., & Stuart, J. A. (2004). Valuing customers. *Journal of marketing research*, 41(1), 7-18.
- [28] Heino, M. (2015). Improving Gross Profit Margin in a quick service restaurant.
- [29] Heinrich, O., Mussa, A., & Zerbi, S. (2016). How retailers can improve price perception profitably through KVI's and KVC's. *McKinsey Marketing and Sales*. Retrieved from <https://www.mckinsey.com/industries/retail/ourinsights/how-retailers-can-improve-price-perception-profitably>
- [30] Kaplan, R. S., & Norton, D. P. (1992). The Balanced Scorecard – Measure That Drive Performance. *Harvard Business Review*, 70(1), 71-79
- [31] Karaesmen, I., van Ryzin, G., Vulcano, C., & Talluri, K. (2008, December). Revenue management: models and methods. In *Proceedings of the Winter Simulation Conference* (pp. 148-161).
- [32] Kabukin, D. (2014). *Reviewing the Blue Ocean Strategy. Is the Blue Ocean Strategy valid and reliable?* (Master's thesis, University of Twente).
- [33] Kermisch, R., Burns, D., & Davenport, C. (2019). Dynamic Pricing: Building an Advantage in B2B Sales. *Bain and Company*. Retrieved from <https://www.bain.com/insights/dynamic-pricing-building-an-advantage-in-b2b-sales/>
- [34] Kim, W. C., Mauborgne, R. (2005). How to create uncontested market space and make the competition irrelevant. *Harvard Business Review*, 4(13), 1-2.
- [35] Klemperer, P. (1995). Competition when consumers have switching costs: An overview with applications to industrial organization, macroeconomics, and international trade. *The review of economic studies*, 62(4), 515-539.
- [36] Madureira, A., & Santos, J. (2005). Proposal of multi-agent based model for dynamic scheduling in manufacturing. *WSEAS Transactions on Information Science and Applications*, 2(5), 600-605.
- [37] Montgomery, A. L. (1997). Creating micro-marketing pricing strategies using supermarket scanner data. *Marketing Science*, 16(4), 315-337.
- [38] Noble, P. M., & Gruca, T. S. (1999). Industrial pricing: Theory and managerial practice. *Marketing science*, 18(3), 435-454.
- [39] Peffers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A design science research methodology for information systems research. *Journal of management information systems*, 24(3), 45-77.
- [40] Phillips, R. L. (2005). *Pricing and revenue optimization*. Stanford University Press.

- [41] Rigby, D., & Bilodeau, B. (2015). Management tools & trends 2015. *London: Bain & Company.*
- [42] Saghiri, S., Wilding, R., Mena, C., & Bourlakis, M. (2017). Toward a three-dimensional framework for omni-channel. *Journal of Business Research*, 77, 53-67
- [43] Schwartz, D. G. (2000). Concurrent marketing analysis: A multi-agent model for product, price, place and promotion. *Marketing Intelligence & Planning*, 18(1), 24-30.
- [44] Stein, A., & Ramaseshan, B. (2016). Towards the identification of customer experience touch point elements. *Journal of Retailing and Consumer Services*, 30, 8-19.
- [45] Stephen, A. T., & Toubia, O. (2010). Deriving value from social commerce networks. *Journal of marketing research*, 47(2), 215-228.
- [46] Taylor, T. A. (2018). On-demand service platforms. *Manufacturing & Service Operations Management*, 20(4), 704-720.
- [47] Verschuren, P., Doorewaard, H., & Mellion, M. J. (2010). *Designing a research project* (Vol. 2). The Hague: Eleven International Publishing.
- [48] Vilarinho, S., Lopes, I., & Sousa, S. (2017). Design procedure to develop dashboards aimed at improving the performance of productive equipment and processes. *Procedia Manufacturing*, 11, 1634-1641.
- [49] Voorhees, C. M., Fombelle, P. W., Gregoire, Y., Bone, S., Gustafsson, A., Sousa, R., & Walkowiak, T. (2017). Service encounters, experiences and the customer journey: Defining the field and a call to expand our lens. *Journal of Business Research*, 79, 269-280.
- [50] Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS quarterly*, xiii-xxiii.
- [51] Wieringa, R. J. (2014). *Design science methodology for information systems and software engineering*. Springer.
- [52] Willart, S. P. (2015). Price competition in retailing: The importance of the price density function. *Journal of Retailing and Consumer Services*, 26, 125-132.
- [53] Zhang, J. Z., Netzer, O., & Ansari, A. (2014). Dynamic targeted pricing in B2B relationships. *Marketing Science*, 33(3), 317-337.

Appendices

Appendix A

Literature Review

Firstly, to obtain the important insights in the field of pricing the relevant papers were reviewed, both scientific and non-scientific. From the obtained literature, the pricing strategies, methods and its impact on customer behavior are to be identified. Accordingly, after this in the empirical phase, it will be helpful to design the dashboard and to review the other design related articles. The paper published by Webster and Watson, (2002) was used as a reference to improve the identification of available literature. In their paper, Webster and Watson recommends a structured approach for the determination of source materials (existing literature). The suggested approach consists of three separate steps, which are applied in this literature review.

Firstly, search keywords were identified beforehand to ensure a broad and focused review. The defined keywords for the literature review are "dynamic pricing", "value-based pricing", "dashboard dynamic pricing", "KVI", "design a dashboard", "wholesaler", "retailer". With these described keywords, the structured approach first step could be executed. However, the literature papers on designing a dashboard specifically for dynamic pricing is rather limited, so the keywords to review the dashboard articles will be collected from the interviewed answers. In the first step, literature is identified using several platforms such as Scopus, Academia.edu, Reserachgate. Even though some of the articles are not officially published, they still prove highly valuable for this research.

Secondly, as suggested by Webster and Watson, the process was to be done "backwards". In other words, the identified literature from the first step will be used as a reference to find another set of literature paper, by analyzing the reference list from the found papers.

At last, the literature review was to go "forwards". More specifically, the articles that had cited the articles that were identified in the previous step were analyzed and were added to the reference list. In additional, all the papers in the reference list were individually summarized using one fixed structure. These questions were framed by reading through the abstract, introduction, conclusion and chapter description of each of the papers.

Moreover, the questions used for summarizing the identified literature are listed below. There are 2 sets of questions, one set for Pricing related articles and other set for Designing a dashboard related article.

For Pricing Papers,

1. How are the dynamic/ algorithmic pricing strategies are described in the existing literature? How these strategies have effect on customer behavior?
2. In what specific context the pricing strategy, methods/conditions are determined?

For Design Papers,

1. Which pricing strategies/ features to be included on the dashboard?
2. How dashboard is helpful to wholesalers and retailers?
3. What are the main functionalities of the dashboard?
4. Who are the main users of the dashboard?

Appendix B

Interviews

B.1 Interview Setup

An interview was conducted with several different experts from the field of pricing especially from wholesale companies. Six types of experts, each with highly different positions and perspectives were interviewed to ensure that as much information as possible was collected, including as many differing perspectives as possible. As a result, the following experts were interviewed:

- Marcel Cappens a Manager Pricing and Conditions at company X
- Adger Banken, Director Wholesale & Procurement at DLF
- Maarten Hoksbergen, Pricing Manager at Kramp
- Robert Lane, Financial Director at Egmont Group
- Thyminen Kristen, Market Intelligence Specialists at Wiltec
- Joshua van Beekum, Manager pricing and commercial support at Technische Unie

The interviews each take up around 20 to 40 minutes. The main structure of the interviews is to be prepared in advance of the actual interviews due to the semi-structured and open-ended question style. This allows for a framework containing a list of fixed questions. Moreover, this set of questions gives clear overview of the interview and whenever necessary it allows for flexible conversations, leaving room for discussions and follow-up questions. Below, the structure of each set of questions of the interviews is described:

B.1.1 Interview Questions

The main goal of this interview was to obtain answers regarding the pricing strategy and designing a dashboard according to company's requirements. Below, the main 5 set of the interview questions are listed:

Pricing Strategy Questions:

1. Which pricing strategy are you currently focusing on and which pricing strategy you would like to focus on, is it should be,
 - (a) Value-based pricing
 - (b) Competitive-based pricing
 - (c) Fair-value pricing
 - (d) Cost-based Pricing
 - (e) Psychological aspects of assortment pricing
2. Who are your main target customer groups?
 - (a) Which categories and items might affect your customer target groups?
3. How would you like to improve your customer perception profitably?
4. What is your market position? How it should be compared with the other brands?

Process of pricing Questions:

1. How often do u want to adjust online or offline process of pricing?
2. Who are the main users and what are their roles?

Business Questions (Business Logic):

1. What is your optimal price in relation to the cost margin? of the leading product (key value item per customer group) taken into account the gross margin of the whole basket?
2. What is the difference between your optimal price and the current price?
3. What is the competitors price and how do you compare taken into account for example, value added services?
4. Based on business rules what is your new price? For example, discount per customer group.
5. What price you will publish and what discount can you give per customer group (added value per customer) based on price elasticity of group and the potential upsell of that customer (B2B) or Customer group (B2B and B2C)?

Tooling Questions:

1. Currently do you use any dashboard tool such as Power BI, Tableau and QlikView or Is it custom made?

2. How is it integrated with your market automation process? Is it CRM system or ERP?

B.1.2 Dashboard Questions:

1. What are the pricing decision information should be present on the dashboard?
2. What are the features to be included in this dashboard? (users, promotions, functionalities, Number of competitors, Seasonality of Products)
 - (a) What is your most essential feature?
 - (b) What is your least essential feature?
3. Do u want to monitor your competitors pricing and how would you like to see it?
4. Are there any business rules you would like to apply on your dashboard?
5. Would you like to see the changes and compare with the other competitors when you update a new product?

B.2 Overview of Summarized Results

	Company X	DLF	Van Egmont Group	Technische Unie	Wiltec	Kramp
Pricing Strategy						
Type of Strategy	Value-based, Competitor Based and Price Anchoring	Value-based Pricing	Value and Competition based	Currently their pricing is Cost-based but aim to convert to Value-based pricing strategy	Cost-based pricing	Value-based Pricing
Customer Target Groups	Industry Sectors	Other wholesale customers	Industry Markets	Insulation engineers, Builders, Contractors, Service and Maintenance companies	Automotive, Construction, Agricultural and Food	Dealers, Farmers (but they deliver via dealer)
Categories and Items	MRO articles	Grass seed mixtures	Electronic products	Wires and Cables, Electrical Components, Heating and Climate systems, Sanitary Products, Power Tools	Liquid pumps, Consumable Products and Spraying Products	Agricultural Products, Spare parts which are used in the machine such as Blake cleaner and snow chains.
Market Position	Biggest sales among Britain's top private companies	High market share (with 50% in Europe and 25% worldwide) with market leader in Europe.	Building and electronic materials	Market leader in comparison with the other brands and have 1/3rd of the Market Share	It is different for each product or market combination.	Market leaders in several countries. In Netherlands they have 40% market share.
Improvement in customer perception profitably	By focusing on different prices which has list price and selling price	By increasing market share and selling more value-added products	By process of ordering in relation with customer and by promoting educational and training services.	By making sure that customers know the added value and .	By creating new propositions to broaden the added value for their customer.	By helping their customers to set their stock level, to give all kind of training to the customers.

Table B.1: Overview of Pricing Strategy results

	Company X	DLF	Van Egmont Group	Technische Unie	Wiltec	Kramp
Process of Pricing						
Update of on-line or offline process of pricing	Aiming to set their prices on daily basis	Depends on market circumstances, or 6 times in each month. It is very dynamic.	Two aspects, one side it is supplier driven, for special materials which is not in mainstream it is once a month and the other side for their mainstream of customers the update the prices twice a year.	1. Do not set their prices very often because it depends on their products. If they have 10-20% sales, then they set their prices as regular as possible mostly within a every quarter and 2. For rest of the assortment it is adjusted once a year	Within every negotiation with customers, and for online it is static	1. They set the prices every Quarter where they calculate all the prices 2. Sometimes in between the emergency update, such as if there is a mistake in input matrix for example, purchase price. 3. Perhaps In future it is more often, like once in a month or every day.
Users	Operational Managers	Tailor-made	Combination of sales and advertising team	4 FTE team	Accountancies (Sales Managers)	Along with the interviewee, two other pricing managers and product group managers.

Table B.2: Overview of Process of Pricing results

	Company X	DLF	Van Egmont Group	Technische Unie	Wiltec	Kramp
Business Logic						
Optimal Price	Different for strategy or for-Profit optimum	The higher the price in principal the higher the gross margin depending on the production price. In principal the higher is the better.	Confidential Information	On the KVI, usually it is couple of % above the cost.	Currently, they are working hard to get these insights.	It depends on the product, because for some products it is good to have big margins but for some it's not. Optimal margin is as much as they sell the product.
Difference between their Optimal and Current Price	Pricing is mainly about rating products	Optimal price would be 10-15% higher than their current price	Confidential Information	For 4 million products and difference b/w price they want to know 1. Exactly what is costs 2.What is WTP	Currently, they don't know what their optimal price should be.	Their difference between the current and optimal price depends on the price elasticity.
Competitors Price	Don't want to compare to their competitors, because It is easy to automate a lot than doing it manually	Their Competitors price is not open until now as they are not publishing. They are picking up competitors' price from business areas brokers.	They compare with their competitors by delivering material as a wholesaler	Low prices can be found online on direct to competitors but difficult to find offline competitors price	No insights of competitors prices.	They compare on product level with their competitors.

Table B.3: Overview of Business Process results

	Company X	DLF	Van Egmont Group	Technische Unie	Wiltec	Kramp
Business Logic						
New price based on their Business Rules		Freedom to operate 5% up and down		Aim to sell the product in 15% of the cases for a discount 50% or less discount.	At present they do not have logical rules for their new price.	Their new price depends on the WTP which is based on the elasticity. Besides that, dealers can always choose their own price which is recommended by them.
Price Discount per Customer group		Do not have a document protocol for the salesperson	Based on the project they will publish discounts otherwise usually they will not offer discounts.	Based on information of KVI's they share that information in pricing and if the customer has a discount then they publish only that discount.	They do not have any insights yet.	They have the Qune status a product which is part of product group with combination of discount profile.

	Company X	DLF	Van Egmont Group	Technische Unie	Wiltec	Kramp
Tooling						
Other Tools	Power BI and Tabelau	No, they do not use any dashboard tool. They just use Power BI dashboard for sales information and invoice sales.	Power BI	Power BI, Excel, and Separate dashboard for Price sensitivity	QlikView	Tableau development tool- to develop applications and web screens to calculate the prices.
Integration with CRM/ERP system	ERP system for tableau and transactional data	ERP	ERP	It is integrated with the ERP system where in place or also in IT system, especially in price setting, it is automatically processed so that right price gets the invoice	CRM	OSM which is ERP. Besides that, they are aiming to create in their own system.

Table B.4: Overview of Tooling results

	Company X	DLF	Van Egmont Group	Technische Unie	Wiltec	Kramp
Dashboard						
Pricing Information	1.Suggest a price which should motivate people to start working alongside with the system itself against system which is used. 2. Price recommendations and its impact on changing purchasing price for their customers.	1. Market Dynamic, Market prices,Different indications for area managers to make a deal. 2. Own Prices, Trends, Currentcies, the market from brokers (brokers have quotations) and production acreage	1. What material or product group is better than the other customers? 2. On what customer it is, and what product it is and to discuss with account manager why there is price difference between two customers	1.Template between the costs and WTP 2. Stock position of their competition 3. Prices found online, prices from competitors.	1. The discounts for variety of customers for every Elasticity. 2. Suggestions of groups of customers for best discount per product? 3. Logic discount strategy for each product different types.	1. Differentiate between dashboard with different dimensions (history and forecast) 2. How is product group developing from past, present and future? 3. Forecasting about changes made 3 months earlier 4. Improving the product group level according to the country. 5. Tracking the frequent changes in purchase price.
Features (most and least)	1.Split the dashboard in two ways, one for operational managers and other for Management perspective (Most Important)	1.Wholesale Quotations from brokers, Currentcies, Production acreage and Statistics on import and export. (Most) 2. The price from the competitors (Least)	1. Benchmarking of certain products groups with certain customers and different suppliers. 2. Sales and margin performance with customers	1.Promotions are minor for their company. (Medium Priority)	1. How do we separate the product ranges to come up with the pricing strategy for that? 2. Also price strategy for customer groups.	1. Price setting and what is the effect on the price changes (Most important) 2. Seasonality of the products (Most) 3. Promotions (Least)

Table B.5: Overview of dashboard results

	Company X	DLF	Van Egmont Group	Technische Unie	Wiltec	Kramp
Dashboard						
Monitoring Competitor's Price	Yes	Yes, they would like to know pricing from competitors but as a reliable source.	Yes, but it's very difficult to see competitors' price for offline shops.	Yes, but it's difficult to see competitors' price for million products.	Yes, First It should be visual sight, if they want to go deeper insight and to analyze the data then it can be a table.	Yes, they would like to monitor their competitor's prices in order to match their most important items with their competitor's items.
Business Rules	Yes	Yes	Yes	Yes, it could be to Monitor sales, Sales drop or increase, Supply positions of competitors, Promotions based on competitors are doing.	Yes, they want to apply to different types of starting levels to different type of customers	No, not directly on the dashboard but they would like to see the effect after the price calculation in purchase and selling price.
Updation of new Product	Yes	Yes	Yes	Yes	Yes, they would like to see everything	Yes, if they have an item that is matched with their competitor, then they would like to act on that product based parameters to follow the changes in the price.

Appendix C

Balanced Scorecard Perspectives

First of all, in order to design the rules and to develop the framework for decision process of pricing Kaplan., and Norton's (1992) theory is applied. That is the balanced scorecard framework. As mentioned earlier in Section 4, this framework is more suitable to apply in this thesis because the goal setting plays an important role in price decision making. Moreover, Balanced Scorecard (BSC) is a strategic planning and management system used by organizations. That is used to identify and improve the company's various internal functions and their external outcomes. In addition, it is used to measure and provide feedback to the organization. The system connects the dots between big picture strategy elements such as mission (our purpose), vision (what we aspire for), core values (what we believe in), strategic focus areas (themes, results and/or goals). Besides that, the more operational elements such as objectives (continuous improvement activities), measures (or key performance indicators, or KPIs, which track strategic performance), targets (our desired level of performance), and initiatives (projects that help you reach your targets).

The paper published by Ceresia, F., & Montemaggiore, G. B. (2010) was used as a reference to understand the four perspectives. In this paper Ceresia & Montemaggiore (2010) recommends a structured framework to set a goal in order to improve in any decision-making process. The suggested framework consists of four different perspectives:

1. *Customer perspective*: This perspective views organizational performance from the point of view of the customer or other key stakeholders that the organization is designed to serve. Especially, customer perspective refers to the improvement of the company image with increase of the customer base. There are performance measures that can be taken in order to maintain the customer relationships. For example, grouping the customers to understand their buying behavior will improve the customer satisfaction and number of sales.
2. *Learning and growth perspective*: This perspective refers to the designing an adequate innovative system which adds value to the customers. In this thesis, the innovative approach is applied by designing simple mathematical models (elasticity and revenue) with

theoretical approach (red and blue ocean strategies). This is also defined as Organizational Capacity perspective where the organizational performance is measured through the lenses of human capital, infrastructure, technology, culture and other capacities that are key to breakthrough performance.

3. *Internal process perspective*: This perspective refers to the improvement in the business process that impacts the customer satisfaction. Therefore, in this study we have considered the touchpoints in order to understand and improve the customer journey. The touchpoints can be advertisements, quotes, discount strategy etc. In addition, this perspective is also defined as organizational performance view through which the lenses of the quality and efficiency related to the product or services.
4. *Financial perspective*: This perspective views organizational financial performance and the use of financial resources. In addition, it refers to the improvement of company profitability. Therefore, in this study the gross margin and sales margin have been measured to understand the company's financial performance.

The ultimate objective of most businesses is to increase their profits. Therefore, in this study the framework with (above mentioned) four perspectives has been used. In addition, to design the rules which helps in decision process of pricing. Besides that, balanced scorecards provide a framework for translating strategy into actionable content through causality. According to the causal relationship, the division of the strategic objectives of the enterprise can be decomposed into several sub-goals to realize the strategic goals of the enterprise. These sub-goals are the goals of all the companies. Similarly, the mid-level goals or evaluation indicators can continue to be subdivided according to the causal relationship until finally formed. Performance indicators and goals that can guide individual actions.

Appendix D

Prototype

Main importantly, in order to communicate and to evaluate the process, the dashboard is used as prototype with the interviewees (Ganhholm, 2013). The paper published by Vilarinho et al (2017) has been used as a reference to design the dashboard and to represent it as prototype. Vilarinho et al (2017), applies the design procedure to design the dashboard which consists of five phases.

Firstly, applying the diagnosis stage such as gathering the information, conducting the semi structured interviews. This is in order to understand the existing state of the pricing strategies and to identify priorities to take into account in improving the processes. In this study phase, the diagnosis has been done in the early stage of the project by reviewing different literature papers and by conducting the semi-structured interviews.

Secondly, understanding the needs of the companies requirements of the dashboard to avoid the gaps between stakeholders' expectations in the final version. The requirements should be identified based on the purpose, user characteristics, purpose and decision-making. The same procedure is applied in this thesis to know the interviewees requirements. For instance, which pricing strategy they would like to focus on and which pricing functionalities they require on the dashboard to improve their price decision making.

Thirdly, defining the template of the dashboard. This means converting the requirements mentioned in the previous stage to technical solution. In addition, it can also be defined as a model that meets the necessary requirements of the dashboard, in the context of the six interviewed companies (Vilarinho et al., 2017). In this case, design rules and the framework has been designed to incorporate the requirements of the interviewees. In the beginning it must be designed in such way that it allows suggestion and enables adjustments in order to meet the priorities of the company.

Subsequently, identify the key factors for its operation and management such as required in-

puts and desired outputs. In this study, the key factors are customer segmentation, customer added-value, touchpoints and price optimization.

Lastly, implementation and evaluation of the dashboard has to be approached. This is because it analyzes the dashboard and makes possible improvements. In this way, the same five procedure has been applied in this study.

Appendix E

Evaluation

E.1 Evaluation Setup

A second round of interview was conducted with same six different experts from the field of pricing especially from wholesale companies. As a result, the same experts as mentioned in the Appendix B were interviewed for evaluation process.

The second interviews each take up around 30 to 45 minutes. The main structure of the interviews is to be prepared in advance due to the semi-structured. The interview was conducting firstly by giving introductory presentation on what framework has been used in designing the dashboard and the showing the demo of the dashboard. As it was semi-structured interview therefore, it contained both closed and open-ended question style. This allows for a framework containing a list of fixed questions. Moreover, this set of questions are formed in the google form which has been sent later to each interviewee. Below, the structure of each set of questions for the second interview is described:

E.1.1 Open and closed end Questionnaires setup for Evaluation Process

1. Does the prototype provide an efficient and usable means of for process of pricing?
 - (a) Was all the information relevant?
 - (b) Was the level of the information suitable?
 - (c) Did you miss any information? General or application specific.
2. Do you find the functions (segmentation, price elasticity. . .) useful? To make it clear the below table gives options to choose for a particular function.

Functions	Essential	Nice to have	Too much Information
Price Elasticity			
Revenue			
Touchpoint:Discount Strategy			
Touchpoint:Delivery Time			
Gross Margin			
Sales per Distributed Channel			
% Sales Price			

- (a) Were all the functions relevant?
- (b) Did you miss any function?
3. What is your overall impression of the prototype design, information content, and performance?
4. What might be the advantages and limitations of this prototype design with respect to information (process of pricing) and interpretation?
5. Please provide any additional comments.

E.2 Overview of Evaluation Results

	Interviewee1	Interviewee2	Interviewee3	Interviewee4	Interviewee5	Interviewee6
1	Yes	Yes	Yes	Yes, it provides very useful insights	Yes	Yes
1.a	Yes, though logistical performance does not influence elasticity (as somehow presumed)	Yes, it was. Next step to combine the information more, like which customer is more price sensitive?	Yes	The 4 perspectives were all relevant, however one perspective was more relevant than the other.	Not all but that is depending on specific market dynamics	Sorry, no good overview over the complete dashboard
1.b	Yes	Yes, it was because it was very detailed, even on item number.	Absolutely, Yes	Yes	Good level	Yes
1.c.	Peer comparison	No	What could build upon this version is more actionable insights: e.g. which prices should I change that have the lowest risk and highest gain?	No	Import and export status would be relevant for our branch	No

Table E.1: Overview of pricing information results

	Interviewee1	Interviewee2	Interviewee3	Interviewee4	Interviewee5	Interviewee6
2	Segmentation	Essential	Essential	Essential	Essential	Essential
	Price Elasticity	Nice to Have	Essential	Essential	Essential	Essential
	Revenue	Essential	Essential	Essential	Essential	Nice To have
	Touchpoint: Discount strategy	Essential	Essential	Nice To have	Nice To have	Nice To have
	Touchpoint: Delivery Time	Too much information	Essential	Nice To have	Nice To have	Too much information
	Gross Margin	Too much information	Essential	Essential	Essential	Essential
	Sales Margin per distributed channel	Too much information	Essential	Essential	Essential	Nice to Have
	%Sales Price	Nice To have	Essential	Essential	Essential	Nice to Have
2.b	Were all the functions relevant?	Not all, the function to change prices for all items in a product group is great but these items' volume reacts to each other, so there's a differentiation required.	Yes	Yes	Yes	Sorry, no good overview over all the functions.
2.c	Did you miss any function?	No	No	No	No	Realtime (or based on current data)?

Table E.2: Overview of functionalities results

	Interviewee1	Interviewee2	Interviewee3	Interviewee4	Interviewee5	Interviewee6
3	Doing really well	The prototype is a nice starting point for price decision-making. Good performance and nice graphs.	Whole typically has a lot of products, in our case a lot more than the data set.	I think the framework you used with the different perspectives combined is valuable. This way a holistic approach of wholesale pricing is enabled	Looks very nice and interesting	It gives a good overview with sufficient flexibility to manage pricing issues within a company
4	Extraction and application, how to transform information in a dashboard into a price change?	Sometimes calculations over the whole product group could lead to wrong conclusions. Advantage is that you have a lot of information in a clear, summarized overview.	When updating pricing for millions of articles, there should be a link between the dashboard and the price processing software	The dashboard requires a high level of data literacy. The wholesale business is quite a traditional business. So, there are some challenges.	Very quick overview, limitations I cannot judge but for a different design and new graphs would be nice to know how it can be implemented	Sorry, I don't have an overall overview of the complete
5	Please remember that the price change on product A has an impact on the volume change of product A and B !!	Good job! Nice starting point for further development, to sharpen the definitions.	Perhaps a couple of use cases can be applied to optimize the dashboard: such as what promotion price should be taken for penetration strategy, or which assortment is continuously under performing.	I was impressed by the result and the demo dashboard. In a short period of time you realized a holistic and theoretical approach and applied it to a practical case. Very nice!	Very nice work done! I will look further into it how to implement for our business	A profound / good essential dashboard.

Table E.3: Overall overview of evaluation results