

# BUSINESS CASE DEVELOPMENT: CATEGORIZATION AND CHALLENGES

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## Abstract

Every new product launching industrial company faces the difficulties of forecasting future success or failure of a new product before launch. Before launch it is common to develop a business case in order to estimate future quantities and set prices. In the present paper the challenges of developing a standardized business case tool for a large industrial construction and mining company are presented. Few academic studies have been conducted on the challenges and complexities of developing business cases. The research question under which this study is done is: *What are the challenges associated with developing an effective standardized business case tool for a large industrial construction and mining company?* Due to the different subject areas of the business case for new product launch, the challenges are categorized by topics developed by the researcher in the course of this project: process and team, data gathering and validation, quantity forecast and price forecast. The main challenges found in these categories by the researcher are: finding and motivating experts for the project of developing a standardized business case, gathering and selecting all data necessary without including redundant data, ensuring that different potential new products can be forecasted and designing the price forecast to be profit-maximizing. Solutions to these challenges are provided in the context of a case company by using methods suggested by the academic literature and the evaluation of expert interviews inside the case company.

**Key words:** business case, price forecasting, demand forecasting, quantity forecasting, new product launch

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# 1 Introduction

In this chapter a brief introduction of the present research is given and the structure of the thesis is presented.

## 1.1 Motivation and Introduction

Innovating and launching new products are among the most important activities an industrial company undertakes. Sustainable market share is only provided as long as new products distinguish from existing and competitors' products in at least one aspect. However, launching new products is always accompanied by a certain degree of risk. This degree depends on several aspects. For example, launching a predecessor of an existing product of the portfolio usually is less risky and more predictable than launching a completely new product, which did not exist in the company's portfolio yet (Kahn, 2014).

In order to forecast whether a product launch will bring benefit, typically an economic *business case* is put forward. The dictionary definition for the term business case refers to a "justification for a proposed project or undertaking on the basis of its expected commercial benefit" (Oxford dictionary online, last accessed 08/08/2016). Ritter and Röttgers (2008) refer to a business case as a toolbox, which enables the understanding of the project context and gives suggestions to quantitatively and qualitatively analyzed scenarios, which are necessary for a solid investment decision.

In the academic literature a distinction among economic business cases and social business cases is made. Whereas an economic business case is conducted in order to weight potential financial benefits with potential costs, the social business case is conducted in order to measure the benefit to an individual or society regardless of costs (Leatherman et al., 2003). In the course of the present paper the term *business case* always refers to the economic business case. A more detailed definition is given in section 2.1.

In a perfect world this economic business case includes all determinants and factors that will cause success or failure of the new product. Here success is defined by increasing financial profit through net sales that are higher than costs, whereas failure is defined by decreasing financial profit through net sales that are lower than costs. Therefore, each potential future product has to be observed in detail. Based on historical sales data and expert judgments a forecast of prices and quantities under different circumstances has to be calculated. Especially in a company with diverse business units, this is a time consuming process with many employees involved. Despite the time and effort it requires, the forecast is still vague and highly dependent on expert knowledge.

The academic literature has focused on different topics in the business case for new product launch such as price forecast or quantity forecast. However, many methods suggested by researchers are not tested in businesses (Kahn, 2014). Also the business case for new product launch and the dynamics between its components have hardly been investigated by academic researchers yet.

The present research enriches the existing literature by providing insights into the development of business cases for new product launch. The researcher raises the research question: "*What are the*

*challenges associated with developing an effective standardized business case tool for a large industrial construction and mining company?”* The challenges she faces on the way of developing a standardized business case tool in cooperation with a large industrial business-to-business (B2B) company that is operating in the construction and mining industry are presented. These challenges are clustered by the researcher, based on this investigations and findings, into the following four categories:

- (i) process and team
- (ii) data gathering and validation
- (iii) quantity forecast
- (iv) price forecast

Based on a qualitative study inside the case company and a thorough literature research, the challenges are specified and categorized by the researcher and suggested solutions are presented. Approaches for how to structure the data flow and how to set up a price and a quantity forecast are presented.

## 1.2 Structure of the Thesis

In chapter 2, definitions of a business case from the applied and academic literature are presented. The chapter contains an overview of the topic and the literature review. In chapter 3 the research question is raised and the research methodology is presented. A brief introduction into the case company is given and specifications of this company are pointed out. Chapter 4 gives an overview of the findings of the qualitative research. The challenges in the development of a standardized business case are presented in chapter 5. Here the case study outcomes are presented in light of major themes and models identified in the literature review. The present study is concluded in chapter 6. The main outcomes are presented, limitations are pointed out and suggestions for future research are made.

## 1.3 Delimitations

This research study is subject to a number of delimitations concerning the scope and the depth of the conducted investigation. The central topic in this study is the business case for new product launch in a large industrial mining and construction company.

Delimitations in the scope and the depth of the present study are according to the nature of a business case for new product launch. In this business case the two alternatives *product launch* and *no product launch* are considered. Within the scope of this decision, the topics data gathering, price forecast and quantity forecast are investigated thoroughly in the present case.

Additionally, the scope of this research is defined due to the data collection through interviews with employees in the strategic marketing department of the case company. The interviewees are experts in business cases for new product launch in five central European countries. Thus, the scope of the present study is formulated to deduce the challenges of a business case, and approaches for their solutions, for new product launch in the European area, conducted by the strategic marketing department of a large industrial mining and construction company.

The core aim of the present study is to enrich the existing literature on business cases, including quantity forecast and price forecast, by a qualitative case study. Statistical correlations to existing findings are not provided.

The present study focuses on the social and economic pillars of sustainability. Environmental aspects are not taken into consideration. The present research helps to develop a standardized business case tool. It helps to make the work of business case developers more effective and thus increases the productivity of developers of standardized business cases and in the long run it increases the efficiency of business case conducting persons. This contributes to economic growth. Additionally, the standardized business case tool facilitates the work for the business case developers. Thus, it contributes to social welfare.

## 2 Business Case Overview and Literature Review

In this chapter the nature and definitions of a business case are presented, followed by the business case structure and the role of a standardized business case.

### 2.1 Business Case in General

The mainstream literature offers a great amount of guidelines and support in developing business cases. Although the term “business case” describes a broad cross-cutting approach within different business areas, the general definitions found in the literature are similar.

According to Taschner (2008, p. 15) every proper business case answers the question, “Which financial consequences arise, if a (business) decision is made like this (and not differently)?” More generally, Maul (2010, p. 4) points out that a business case gives an answer to the question, “What happens if we take this course of action?” Thus, it can be said that business cases help find the optimal decision in a situation where there are at least two alternatives. There is no need of a business case if there is no need of decision making. The definition of a business case as a decision supporting tool shows that it can be used for many different applications in many different stages of product development and launch.

In order to clarify this concept, it is helpful to distinguish it from similar terms. Below the researcher distinguishes the concept of a business case from the terms:

- (i) Business plan
- (ii) Feasibility analysis
- (iii) Business model

**Business case vs. business plan.** In contrast to a business case, a business plan describes the strategies for achieving a certain goal or objective (Taschner, 2008). Barringer (2015) defines the business plan as a detailed plan that describes a venture’s operational and financial objectives and how they will be achieved. A business plan may also include results of a business case to support its proposition. However, the aim of a business plan is to sell a strategy and plan necessary measures (Maul, 2010; Taschner, 2008).

**Business case vs. feasibility analysis.** The business case should also be distinguished from feasibility analysis. Thompson (2005, p. 185) defines the feasibility study as “a controlled process for identifying problems and opportunities, determining objectives, describing situations, defining successful outcomes and assessing the range of costs and benefits associated with several alternatives for solving a problem”. Like a business case a feasibility study supports in a decision-making process. However, in contrast to a business case, a feasibility study gives recommendations about the validity of venture ideas and thus safeguards against wastage of further investment (Bickerdyke et al., 2000). It may also consider the outcome of a business case and drill it down into much further detail.

**Business case vs. business model.** Compared to a business case, a business model describes the rationale for how an “organization creates, delivers, and captures value” (Osterwalder et al., 2011, p. 15). “The business model is like a blueprint for a strategy to be implemented through organizational structures, processes, and systems” (Osterwalder et al., 2011, p. 15). In contrast to a business case, the business model gives information about the whole organization. The business

case just focuses on objectives and the alternative ways to reach these with special regard to financial aspects.

Taschner (2008) defines the business case as the analysis of at least the financial impact of a decision. According to him, a business case is not a business case if the financial effect is not regarded. Maholic (2013) also points out that a business case is about gaining money by spending it effectively. He focuses on the financial aspect and states that the business case is about increasing profits.

### 2.1.1 Structure of a Business Case

In the applied literature several suggestions of how to structure a business case can be found. Below, the researcher presents two recommendations in order to provide an idea of what a business case looks like.

According to Gliedman et al. (2004) the business case is not only a document that demonstrates the financial aspects of a project, but also the “who, what, when, why and how” of a project. Gliedman et al. (2004) and Maul (2010) therefore point out six key elements of a business case:

- (i) Executive summary
- (ii) Key compelling factors
- (iii) Solution description
- (iv) Overview of financial impact
- (v) Identification of stakeholders
- (vi) Timeline

**Executive summary.** The executive summary gives a first idea of the subject of the business case. It provides a rough overview of what is done. Maul (2010) suggests to include the opportunity statement by presenting all opportunities investigated.

**Key compelling factors.** These factors specify the reason why this project is proposed at this special point in time. This is especially recommended for business cases that are conducted for the initiation of a project. The chosen time is more important for projects than for product launches. This is because an industrial company frequently launches new innovative products and needs this to be competitive (Gliedman et al., 2004; Maul, 2010).

**Solution description.** This part contains the problems that will be solved by conducting the project or launching the product (Gliedman et al., 2004). It also includes of the proposed solution. Maul (2010) recommends to also add the alternatives that have been investigated and performance metrics.

**Overview of financial impact.** A summary of costs and benefits and additional parameters has to provide a clear understanding of why the investment is good for the company. (Gliedman et al., 2004; Maul, 2010)

**Identification of stakeholders.** This part identifies all individuals and groups that are impacted by the project or product launch have to be clearly identified (Gliedman et al., 2004).

**Timeline.** This section includes milestones of expected returns and benefits of the project or product launch (Gliedman et al., 2004). The aim is to demonstrate how the company will benefit from the recommendation of the business case (Maul, 2010).

### 2.1.2 Steps of Business Case Development

Maul (2010) identifies seven steps of business case development:

- (i) Definition of the opportunities
- (ii) Identification of alternatives
- (iii) Data gathering and time frame estimation
- (iv) Analysis of alternatives
- (v) Choice making and assessment of risk
- (vi) Creation of a plan for idea implementation
- (vii) Communication of the case

**Definition of the opportunities.** As a starting point of the business case procedure, opportunities for the company are specified and roughly analyzed from their nature.

**Identification of alternatives.** Alternatives of how to implement the opportunities are considered and specified as alternatives.

**Data gathering and time frame estimation.** The data needed to analyze the alternatives are identified in terms of its time frame, level of detail and quality. Subsequently, the identified data is gathered.

**Analysis of alternatives.** The different alternatives specified in step (ii) are analyzed and weighted against each other.

**Choice making and assessment of risk.** One alternative is chosen based on the analysis in step (iv). The risks that it has for the company are assessed.

**Creation of a plan for idea implementation.** The time frame is ultimately set and milestones are identified. Arguments for and against the implementation of the project or product launch are prepared.

**Communication of the case.** The case is presented to the judging audience.

### 2.1.3 Importance of a Standardized Business Case

At first sight, standardizing a decision support tool does not seem intuitive. However, the literature on business case development supports the idea of building a business case template. Maholic (2013) mentions that, even though each business case differs from the other, all business cases have some things in common and that a business case template can make the job of the business case developer much easier.

Hocker and Slay (2011) develop a business case template for organizational-level testers of the U.S. Air Force. They point out that one benefit is that the standards of comparison of operational needs and project benefits are the same for each business case developed with the same template.

Van Putten (2013) develops in his dissertation an approach for dynamic reuse of business cases. He points out that standardized business case components improve the efficiency and effectiveness of business case development.

The literature supports the importance of a standardized business case. However, a literature review shows that the standardization of a business case is hardly investigated yet.

### 3 Methodology

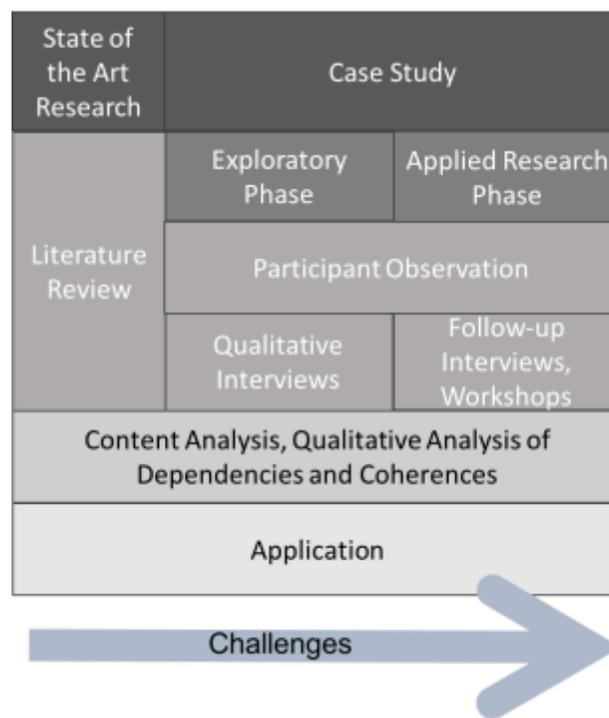
In focus of the present thesis is to point out the challenges on the way to developing a standardized business case tool for a large company operating in the construction and mining industry. For this thesis, the following research question is posed:

**RQ: What are the challenges associated with developing an effective standardized business case tool for a large industrial construction and mining company?**

In order to answer this question, the researcher focuses on one case company and conducts qualitative research. The research process is presented in Figure 1.

Initially a literature review was conducted on the topic of business case development in general and certain selected subtopics of business case development. At the same time, the case study inside the observed company started. Participant observation was conducted during the whole case study. The case study is divided into two parts: the exploratory phase and the applied research phase. In the exploratory phase the researcher became familiar with the company and the general concept of business case development. Experts were detected and interviews were conducted. In the applied research part, the gained knowledge was applied and the standardized business case tool was developed. In the scope of workshops and follow-up interviews, details were discussed and aligned. Additionally, the literature research was extended to the special topics of business case development and academic methods were applied in order to solve challenges. Challenges were traced during the whole study.

Figure 1: Structure of Research



## 3.1 Case Study

In this section the characteristics and methodology of the present case study are presented, followed by a brief introduction of the case company.

### 3.1.1 Unit of Analysis

The unit of analysis is the definition of the case (Yin, 1994). In general, it relates to the definition of the research questions (Yin, 1994). In the present case, the unit of analysis is chosen to be the process of conducting a business case. The starting point of this process is the knowledge and information about a new product. The ending point of this process is the presentation of the business case tool. Subunits are *the process of setting and finding a valid database, the process of quantity forecasting and the process of price forecasting*.

### 3.1.2 Case Study Type

The researcher decides to conduct a single case study. According to Yin (1994, pp. 38-40), there are at least three circumstances under which a single case study is appropriate.

- (i) It “represents the critical case in testing a well-formulated theory”
- (ii) The case “represents an extreme or unique case”
- (iii) The single case study is a “revelatory case”

In the present case, the third rationale is the main driver for using a single case. Business cases are in direct relation to profit maximizing strategies and are based on internal, highly confidential datasets. The researcher got the unique opportunity to investigate one large industrial company in the mining and construction industry.

Ryan et al. (2002) identify four case study types.

- (i) Descriptive case studies
- (ii) Illustrative case studies
- (iii) Experimental case studies
- (iv) Exploratory case studies

A case study of type (i) is appropriate in case the objective is restricted to describe current practice. In case the research aims at illustrating new and possibly innovative practices adopted by particular companies, case study type (ii) should be chosen. The research of case study type (iii) examines the difficulties in implementing new procedures and techniques in a company. If existing theory is used to understand and explain what is happening, a case study of type (iv) is applicable.

The present case study is based on case study types (iii) and (iv). On the one hand the researcher examines the difficulties in implementing new procedures and techniques in the case company. On the other hand, existing theory is applied to the process of developing a business case in order to understand how it is done.

### 3.1.3 Representativeness of Sample

There are two selection criteria for the sample: the size and the industry.

According to the European Commission (EU-Kommission, 2003), a large enterprise is characterized by having more than 250 employees and a balance sheet total of more than 43 million Euro. The chosen company fulfills both with about 20,000 employees worldwide and a balance sheet total of about 2,500 million Euro (in 2014).

The focus of this research is on industrial companies in the mining and construction industry. Relying on the definition of the company itself, it is a business-to-business firm operating in the construction and mining branch with specialization in fastening technology. Thus, the case company fulfills this selection criterion as well.

### 3.1.4 The Case Company

In this section the researcher will give a brief introduction of the observed company and explain specifications of the company that are important to be known for the present study.

#### 3.1.4.1 Brief Introduction of the Case Company

The observed firm is a globally oriented large industrial company operating in the construction and mining industry with a focus on fastening technology. It employs about 20,000 workers in about 120 countries worldwide and is organized in a matrix structure. Here matrix structure refers to a cross-functional set-up with several reporting lines and managers. It was founded as a family business about 70 years ago and is still owned by the founding family. Most of the products offered are premium products on the market. Thus, customer relations and effective marketing are important. It sells its products to businesses through direct distribution by its own salesforce.

The company is structured globally on three levels. First, there is the overall executive management, which coordinates the overall business from the headquarters. Second, there is the central business level, which coordinates the business for a small amount of countries in the same area. Finally, there is an organizational level for each country separately, the so-called market organization.

#### 3.1.4.2 Specifications about the Case Company with Focus on Business Cases Development

The standardized business case is developed for the central business level of central Europe. This business level includes the market organizations Austria, Germany, Switzerland, the Netherlands and Poland. The focus of the division, the standardized business case is developed with, is on electric tools and accessories. This business area is divided into the business units *electrical*, *measuring* and *diamond*.

The business case is in the responsibility of the strategic marketing department and conducted by the product managers. There are product managers on each of the levels mentioned above. The main responsibility in terms of business cases is down to the central business product manager. They have to report their estimations to the marketing managers, who in turn decide whether a product is launched for the proposed prices for each market organization and the associated quantities in the respective market or not.

The company divides its customers into trade and size classes. Every customer is assigned to one out of seven trades and one out of five size classes. The size classes are also referred to as potential classes.

An important specification for the development of a standardized business case is the offer of a service package, called *fleet*. This service package is comparable to leasing and is offered for

almost all products observed in the business case. The customer gets a product by paying a certain amount of money every month and ensures with this that whenever the product has any issues the producer will take care of it. In general, the net profit margin for fleet sales is higher than for regular sales.

A further specification is the list price increase. The products offered by the observed company are supposed to get more expensive every year. However, in reality this is not always enforceable in order to keep customers. Thus, the prescribed list price increase has to be downgraded again with the pull-through rate. This rate is the fraction of the list price increase that will actually reach the customer.

In contrast to the increase of prices the costs for the company are generally expected to decrease. This is the third specification to be necessarily taken into consideration for the development of a standardized business case.

### 3.2 Literature Review

In order to accurately identify the state of the art in this field of study, a literature review was conducted. The literature research was conducted in three consecutive steps. In each step the topic was defined more narrowly.

In the first step, the key words “*business case*”, “*new product launch*” and “*business case for new product launch*” were utilized to define the topic in general. In the second step, the key words “*price forecast*”, “*demand forecast*”, “*quantity forecast*” and “*database*” were utilized to go deeper into the units of a business case for new product launch. Lastly, special topics of these units were further investigated in the academic literature. Key words such as “*value-based pricing*” and “*bottom-up approach in forecasts*” were utilized in order to identify the state of the art.

Two databases were chosen: Google Scholar and the KTH publication database DiVA. In case the researcher had no access to articles or books, hardcopies were borrowed from the university library in Augsburg, Germany.

### 3.3 Participant Observation

Participant observation is especially useful in the beginning of a project. It helps to understand the context of the observed object and clarifies the reasons for the way processes are structured (Collis and Hussy, 2013). Collis and Hussy (2013, p. 148) additionally point out that the goal of participant observation is to “provide the means of obtaining a detailed understanding of values, motives and practices of those being observed.”

During the six months of research, the researcher was located at the German market organization. She participated in team meetings, the daily routine such as lunch- and coffee-breaks and social activities with the employees. She scheduled weekly meetings with the pricing manager and regular meetings (twice a week) with one product manager to reflect the progress and align next steps. She had access to confidential sales data and further internal material. The researcher paid attention to ethical obligations to maintain confidential.

This observation was partly documented through sporadic notes. Especially when business case concerning topics came up, the researcher documented the discussions. In chapter 5 some references refer to the findings of the participant observation.

The observation was essential in order to conduct the interviews. Through participant observation in the beginning, the researcher understood the structures and the procedure of business case development and got to know potential interviewees.

### 3.4 Interviews

This section presents the qualitative research method within the case study.

According to Creswell (2014) the term qualitative research describes a heterogeneous methodological approach and is especially to be distinguished from quantitative research. Flick et al. (2012) point out that qualitative research is meant to describe living environments out of the view of operating humans from inside out. The answers to the research questions should be made understandable by giving complex facts of the case and cannot just be given in numbers. Since qualitative research methods give descriptive data about individuals, which are not seen as isolated variables but as parts of a whole (Bogner et al., 2002), the inner structure of the object of investigation can be depicted through profound descriptions of the reality.

The research question is crucial. According to Bogner et al. (2002) every investigation is selective and thus only a part of the information of the object of investigation can be reproduced. It is important to narrow the topic and determine method and investigated group.

Qualitative interviews help to get into the object of investigation by getting to know the involved people, their behavior and experiences. A specific kind of qualitative interviews is the expert interview, which is not commonly defined by the mainstream literature. However, according to Boeije (2010) the definition of “expert” depends on the research questions and is specified by the researcher, whereas an expert is chosen to be an expert due to a specific status she is having. Experts represent a certain amount of people involved in the object of investigation and are able to distribute insider knowledge in order to help the researcher to obtain get a detailed view into the object of investigation.

According to Collis and Hussey (2013) research can be either conducted under an interpretivist or a positivist paradigm. Based on the suggestions given by Easterby-Smith et al. (2012), this research has been conducted under the interpretivist paradigm with a semi-structured interview set-up. This means that questions have been prepared beforehand in order to provide a “red thread” during the interview and to gather similar types of information from each expert (Collis and Hussey, 2013). During the interview specific follow-up questions are developed and asked in order to adjust to the individual issues mentioned by the interviewees. Furthermore, the order of the questions varies in each interview, since each expert gives different answers to the aligned questions. The pre prepared questions can be found in Appendix A.

The definition of expert in the present thesis is according to the definition made by Meuser and Nagel (2009). According to them, the expert herself is part of the object of investigation. The title expert is given by the researcher and solely concerns the specific investigation. In the investigated context, the product managers are part of the action field of interest. The overall central Europe product managers have clearly defined special knowledge about the overall business case, due to

their function as business case presenters. Additionally, the market organization product managers have exclusive knowledge about their supervised markets and know about certain specifications about their product group in terms of competitors and pricing in their markets. For special topics inside the observed context, specialists have been chosen to be experts. A pricing manager is chosen to be pricing expert, one experienced product manager on central Europe level is chosen to be the quantity expert and one data scientist is chosen to be data expert. The experts may serve as a medium in order to gain relevant information about the object of investigation. Their professional knowledge, practical and personal experience and their advice are of interest.

In order to gain a clear view on the current state of the art and to gather as much professional experience as possible, seven central business product managers, eight market organization product managers, one pricing manager, one quantity expert and one data scientist were chosen to be interviewed as experts, making for 18 interviews in total. The decision on the interviewees was made after reviewing the structure of a business case and the case company's hierarchies.

The interviews took place either face-to-face (12 interviewees) or via telephone (6 scheduled phone conferences). According to Collis and Hussey (2013) these methods are most target-aiming for complex and sensitive questions such as questions about profit generation and price alignment in business cases. Each interview took between 30 minutes and 90 minutes depending on how much information the experts were willing to provide and their schedules. Notes were taken during the interviews and subsequently preprocessed.

The pre prepared questions for the product managers refer to four different topics:

- (i) Historical Data
- (ii) Price Forecast
- (iii) Quantity Forecast
- (iv) General

The specialists were only asked about their expert topic. Thus, the pricing expert was asked the pre prepared questions concerning price forecast, the quantity expert the pre prepared questions concerning quantity forecast and the data expert was asked the pre prepared questions concerning historical data. The product managers were additionally asked to show the answers by reference to an example of their own business case.

Yin (1994) suggests to conduct pilot interviews before conducting the actual interviews. He points out that it is useful to evaluate the questions and the structure of the questionnaire. Thus, one pilot interview was conducted with one product manager. The pilot interview led to the assumption that the questions were well structured and understandable. However, a few modifications to the order of the questions had been done.

### 3.5 Limitations

The single case study has several limitations. The major limitation is the degree of generalization of the findings. In the present study, the findings are generalized to theory and not to a wider population of large industrial construction and mining companies. This is according to Yin's (1994) position. Leonard-Barton (1990) additionally points out that a multiple case study is always more generalizable than a single-case study. This agrees with the common opinion that more data is more representative.

Chetty (1996) argues that the strengths of a case study outweigh its weaknesses. In the present case study, the limitations have been reduced due to an intensive study for six months inside the observed company. Dyer and Wilkins (1991) mention that good storytelling about a single-case can provide better theoretical insights than multi-case research. The attempt is to understand the process all through and thus have an independent overview of the case company and the unit of analysis. The researcher assumes this to be very important, especially given that the unit of analysis and the data belonging to it are highly confidential. In several shorter case studies, there would not have been time to build a basis of trust between researcher and company employees. This would have brought a high degree of risk of falsified results.

Further limitations occur due to the use of the interpretivist paradigm. The nature of this research paradigm is subjective. It is possible that the researcher interpreted certain claims in the interviews wrongly or not how they were meant by the interviewees. Also the data is limited by the interactions of the researcher with the interviewees. The personal viewpoint of the researcher can lead to a bias in the responses of the interviewees (O'Donoghue, 2006). However, the researcher tried to eliminate the occurrence of biases by wisely extracting insights from the interview outcomes. Jumping to conclusions is avoided throughout the process of interpretation.

Lastly, in participant observation one issue to be mentioned here is that the researcher can have difficulties to objectively interpret the findings. It is possible that the researcher gets emotionally involved with the observed persons (Collis and Hussy, 2013). This can lead to biased descriptions.

## 4 Overview of Findings in the Interviews

The findings are shown in tables 1 to 4. The outcome has been clustered into 13 dimensions, which represent the areas approached in the business cases. The different approaching ways have been indicated as characteristics of these dimensions. Each dimension has between three and eight characteristics. The amount of interviewees that are using the different approaching ways is not weighted here. This is done because the aim is to find the most appropriate characteristics and not the most mentioned characteristics.

The 13 dimensions are the first important knowledge benefit gained in the interviews that help to develop a standardized business case. Historical data gathering describes how data from similar products or predecessors is gathered in order to have representative numbers and a solid base that the whole calculation is built on. These data have to be analyzed over a certain time period to eliminate temporary phenomena caused by certain events that affected the economy and/ or the respective sales market. Further, the required degree of observed detail has to be defined. It is possible to look at single item numbers as well as on product types, families or lines. In the next step the historical data gathered has to be processed and indicators that will help calculating prices and quantities for the new product have to be extracted. This usually is the average net sales price, which can be calculated in different ways depending on the extracted historical data.

Six dimensions concern price forecasting. It is firstly important to define the structure and with that the base of the price determination. Consequently, it has to be decided whether certain firm specific determinants should be included or not. For the observed company these firm specific determinants are fleet prices, list price increases, pull-through rates of list price increases and cost decreases. In course of this paper, these determinants will be further explained.

Quantity forecast is also represented by six dimensions. The set up builds again the base of the forecast and is, up to now, done differently by each product manager. In order to predict the future accurately assumptions about economic growth have to be made. Introducing a new product to the portfolio might cause cannibalization and/ or synergy effects on existing products of the company, thus the extent of these effects and the affected products have to be carved out. Also in the quantity forecast firm specific determinants should be considered. Here the customer segmentation and the variety of potential new products plays a significant role.

For both price and quantity forecast, the values found might be coordinated with certain instances in the company before ultimately setting them. The amount of future years calculated in the forecasting parts differ between the product managers. Thus, this leads to another dimension. Finally, the amount of cases calculated and the way they are calculated have to be set.

In tables 1 to 4 these findings are presented. On the left column the dimensions are presented. These are the categories in which the researcher clustered the interview outcomes. The right column presents the characteristics. These are the different answers the researcher received in the interviews with product and pricing managers, the quantity expert and the data scientist.

The outcome of the interviews shows that the variety of topics investigated is huge and that the depth to which these topics are investigated varies from greatest detail to broad investigations. Thus, in order to provide a precise as possible standardized business case tool to the observed company with the time constraint, the researcher focused first on the topics rated with highest importance in the fields of data gathering, quantity planning and price setting.

Table 1: Interview Outcome Historical Data

DIMENSIONS (Categories Identified by the Researcher from the Interviews)	CHARACTERISTICS (Responses from the Interviewees)
<b>(i) Historical Data</b>	
Amount of queries used to gather historical data	1 query 2 queries (product costs separately) No queries (data taken from existing reports)
Hierarchy level of observed historical data	Product family Product type Product line Item number
Amount of years of historical data evaluation	Just past year 3 years 5 years

Table 2: Interview Outcome Price Forecast

DIMENSIONS (Categories Identified by the Researcher from the Interviews)	CHARACTERISTICS (Responses from the Interviewees)
<b>(ii) Price Forecast</b>	
Price forecast set-up	Historical process of product group/ similar products Customer acceptance test Product costs + profit margin Value add Salesforce price estimation Competitor prices Dragon tool (Price position of product group/ similar products) Combination of two or more
Consideration of product cost decrease	Estimation according to professional experience Estimation according to historical data Not considered at all
Consideration of fleet prices	Fully included in the calculations Optionally included (e.g. on a separate spreadsheet) Not considered at all
Consideration of list price increase and is pull-through rate	Estimation according to professional experience Estimation according to historical data Not considered at all

Table 3: Interview Outcome Quantity Forecast

DIMENSIONS (Categories Identified by the Researcher from the Interviews)	CHARACTERISTICS (Responses from the Interviewees)
<b>(iii) Quantity Forecast</b>	
Quantity forecast set-up	CAGR & past sales Resource management & conversion (top-down approach) Salesforce structure (bottom-up approach) A customer oriented approach (loyalty, pot. New customers) Customer clusters (based on reference source) Combination of two or more
Inclusion of customer loyalty status	Loyalty status found based on product Consideration of official loyalty status from the company Not considered at all
Consideration of cannibalization/ synergy rates	Estimation of rates based on similar historical cases Not considered at all

Table 4: Interview Outcome General

DIMENSIONS (Categories Identified by the Researcher from the Interviews)	CHARACTERISTICS (Responses from the Interviewees)
<b>(iv) General</b>	
Use of economic growth rate	In quantity forecast In price forecast In both forecasts
Future years considered	Only launch year up to 3 years until 2020
Calculated cases	Conservative case Aggressive case Moderate case all three Conservative & aggressive Aggressive & moderate

## 5 Challenges of Business Case Development

Based on intensive literature review, the researcher found only a small number of studies in the academic literature that focus on challenges in business cases for new product launch. However, approaches to certain topics of the business case for new product launch have been made. Especially the methods derived from the literature on forecasting (Chase, 2003; Herbig et al., 1994; Kahn, 2014) and pricing (e.g., Hinterhuber, 2008; Ingenbleek et al. 2008; Kortge and Okokwo, 1993) proved to be applicable to business cases for new product launch. In the following sections, the researcher's findings from the interviews are presented in light of the existing academic approaches from the literature review in order to detect and solve challenges.

In the following sections the challenges of developing a business case for new product launch are presented. Based on the researcher's analysis of the data, they are clustered into the categories:

- (i) Process and team
- (ii) Data validation and gathering
- (iii) Quantity forecast
- (iv) Price forecast

Category (i) sums up the cornerstones of the process of developing a standardized business case tool in a large industrial mining and construction company. Since team members play a significant role in the whole process, the researcher decides to sum up process and team in one category. Categories (ii) to (iv) represent the main parts of the business case for new product launch in the observed company. The literature suggests to additionally observe cost forecasting and profit estimation (Kahn, 2002). In the observed company, however, the costs for a product are not forecasted through the business case. They are a simple input value to the business case. Thus, the researcher could not gather information on cost forecasting from the chosen interviewees. Additionally, the researcher did not chose "profit estimation" as a category, because the future profit is calculated by multiplying the outcome of the quantity forecast by the outcome of the price forecast and subtracting the costs. Thus, the challenges associated with profit estimation either have their roots in the quantity forecast or the price forecast.

### 5.1 Process and Team

The process of developing a standardized business case tool for an international company is complex and has several points of intersection with different departments and people inside the company. Kahn (2002, p. 133) mentions that a variety of multifunctional decisions depend on new product forecasts; these include: "manufacturing decisions on raw material procurement, manufacturing schedules, and finished goods inventory levels; logistics decisions on physical distribution planning and transportation schedules; marketing decisions on marketing budgets and promotion schedules; sale decisions on support materials and salespeople training; and finance decisions on corporate budgets and financial expectations for the new product."

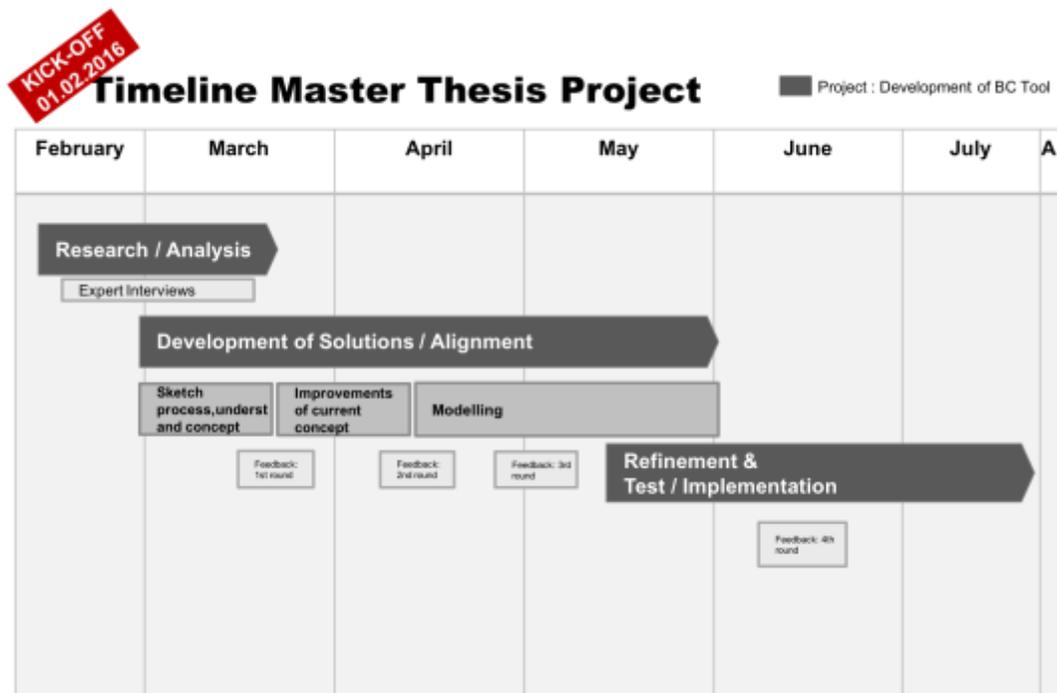
In the beginning of a complex project like this, a schedule has to be defined. The goal is to complete a project within time and budget constraints (Dvir et al., 2003). In their study on 110 R&D projects

in Israel, Dvir et al. (2003) find that project planning is seen as a central element and increases the likelihood of project success.

Before aligning the schedule, an overview of the whole project has to be gained. Hamburger (1992) recommends to get an overview over the project intensively and clarify the objectives of the project in order to reach an effective and rewarding project. Therefore, the departments directly involved are defined. In the case, these are the product management departments on the market level and central Europe level. The key stakeholders, in this case the product managers, have on the one hand the greatest overview over the business case procedure. On the other hand, they are the people who will use the standardized business case tool and are thus the most important people to be regarded in setting the main requirements. A first rough time schedule can be planned.

Figure 2 shows the first time schedule planned for the case project. The time constraint is six months. Extra time-slots are added for four feedback rounds and project loops.

Figure 2: Project Schedule



In the case the first step is research and analysis. The bases are the expert interviews with product and pricing managers in order to understand how the business case is currently done and set more clearly defined sub-goals through the basic requirements of a business case. This is followed by a narrower evaluation of the interviews in order to find possibilities for improvement together with specialists.

The researcher finds that the minimum requirements of a standardized business case tool in the case are a quantity and a price forecast based on a valid database. Going deeper into the topics of these minimum requirements helps finding specialists and departments to work with in that project.

Following the sub processes of finding a database, quantity forecast and price forecast are further investigated.

### 5.1.1 Process of Building the Database

In the interviews it becomes clear that different product managers use different databases. 41% of the product managers used an identical database, whereas 59% used individual databases. In order to find a valid database to build the standardized business case on, data scientists have to be consulted. With their knowledge and tools, data from different sources is cross-checked. Once the valid database is found, the exact data to be extracted from the database has to be defined. Armstrong et al. (2015) recommend using only “relevant, reliable and important” data in the forecasting process. They clearly point out that information that does not meet these three characteristics should not be included in the database. They also suggest asking experts in order to identify these data.

Firstly, the appropriate time frame of historical data to analyze has to be aligned. Armstrong et al. (2015) suggest to focus on the most recent data. However, they also warn against ignoring historical knowledge, since previous experiences are an important benchmark for the present. The project managers mention in the interviews that one to five years of historical data are analyzed in the observed company: 29% of the product managers observe one year, 59% observe three years and 12% observe five years. The time frame of the standardized business case tool for the case company is set to three years, after alignment with product managers who used to analyze up to five years. This is chosen in order to offer a long enough observable time period while offering a properly working tool. The more data inside the tool, the slower it works.

Secondly, hierarchy levels and degree of detail of the single order lines have to be aligned. An order line reflects a transaction between customer and company. It can reflect sales of a product (positive net sales), fleet sales of a product (positive net sales), reparations (positive net sales for ordinary customers and negative net sales for fleet customers, since higher initial fleet prices include reparations) or replacements (negative net sales). An order line can include all customer information such as name, trade and potential class, date of transaction, name of sales person, etc. The required degree of detail of the order lines depends on what the forecasting methods have to analyze and reflect. Thus, this step in the process comes after aligning the main outcomes of the forecasting parts. After setting the forecasting cornerstones it becomes clear that sold products of each order line have to be defined on each portfolio hierarchy. The differences between the portfolio hierarchies are defined in section 5.3.2.1. Additionally, data about trade and size class of the buying customer and the date of transaction have to be included in the order lines.

Thirdly, key performance indicators (KPIs) to extract from the database have to be defined. This again depends on what has to be reflected in the forecasting parts. In his approach to planning, scheduling and controlling, Kerzner (2013) points out that defining the correct KPIs is a joint venture of the project manager and stakeholders. The aim of the forecast is to give net sales, profit and profit margin estimations for fleet sales and for non-fleet sales. Thus, the main KPIs related to quantities, fleet quantities, net sales, fleet net sales and costs have to be historically investigated. In course of the price forecast planning it became clear that additionally the KPIs list prices and discount have to be included.

### 5.1.2 Process of Finding the Cornerstones of the Quantity Forecast

While finding valid data sources, an overview of the minimum requirements of the quantity forecast has to be gained. In the interviews it becomes clear that different quantity approaches for different kinds of new products are appropriate. For example, one product manager mentions: “You cannot compare my products with [name of another product manager]’s products. His products can be used for several years; my products are consumed and thus bought much more frequently.” Thus, the minimum required outcome of the quantity forecast is the possibility of a quantity estimate for any kind of new product of one business area. The different approaches will be further investigated in section 5.3.

In order to align which approaches to necessarily include and to understand which approaches are overlapping, a quantity planning specialist has to be consulted. In the case, an experienced product manager with salesforce background was assigned as quantity specialist. Together with him and with the help of forecasting literature, existing approaches were elaborated to fit for different products and to the case company. Once all approaches are aligned, the KPIs needed for each approach can be named.

### 5.1.3 Process of Finding the Cornerstones of the Price Forecast

The minimum requirements of the price forecast also have to be found before gathering the data. In the interview with the pricing expert it becomes clear that he is not satisfied with how the price alignments are currently done at the observed company. The pricing manager mentions, “The product managers do not fully regard the important aspects of the pricing structure of the company”.

For the price forecast the minimum requirement is to align a price of a new product based on previous discount pricing and the customers’ willingness to pay. This means that historical data about what each customer actually paid must be analyzed. Further details about discount pricing are given in section 5.4.

### 5.1.4 Summary of Challenges in Process and Team

Structuring an interdependent process under a certain time constraint is a challenge. Experts have to be defined and departments involved in the process have to be motivated for the project. The whole process depends on how motivated the involved persons are and how much they want to contribute toward a standardized business case.

Additionally, the experts and specialists have to be chosen wisely. They must not only have the knowledge of their field of expertise, but also must have enough time for contributing to the project. The outcome of the project cannot be better than the people contributing to it.

A further challenge is to align each step and change with stakeholders and experts and in certain cases even with the upper management. Stakeholders, experts and managers have their business and cannot be available for the project all the time. Thus, latency time gaps will occur. The challenge in a time-limited project is to use these gaps effectively without wasting time.

## 5.2 Data Validation and Gathering

The accuracy of a business case stands and falls with the data it is built on. In the interviews, 83% of the product managers mention that the most important part of the researcher's work is to provide a valid database. For example, one product manager mentions: "The most important thing is that I can rely on the data and the outcome of the standardized business case tool. If I have to cross-check the outcome, I do not gain from the tool."

It is essential to have valid data of previous sales. The bigger a company gets, the more difficult it is to extract the right data from data warehouses. Also, the bigger a company gets, the greater the amount of data and the more difficult it is to handle.

From the minimum requirements defined within the process kick-off, it is known that each order line of the past three years is needed for one business area. This means each transaction with customers of products of this business area has to be extracted from the data warehouse. This data includes sales (fleet and non-fleet), reversals and reparations for all products offered in the business area. Lee et al. (2014) develop a pre-launch new product demand forecast approach and point out that the database should contain historic sales data of as many products as possible in order to improve the reliability of the forecasts. It is important to gather these data of all products of the respective business area, also in case products will not have a successor in the future anymore or will be faded out soon. This is because in the forecasting process of new products it can be helpful to analyze the historical development of different products. Chase (2013) points out that it can be a useful approach to predict a new product by observing similar existing products and connect the insights from the historical development with expert knowledge. Additionally, Armstrong et al. (2015) suggest excluding unimportant information to avoid distorted forecasts.

### 5.2.1 Data Validation

In case the data a business case is built on is not valid, the whole forecast is not representative. This can have major impacts on every stage in the company. Chase (2013, p. 286) mentions that any mistake in forecasting can lead to "significant bottom-line consequences". Gilliland (2010) points out that, for example, an overestimate in future demand may lead to the building of new facilities and hiring of new workers. This consequently has a negative effect on profits, in case the forecasted increase in sales does not occur.

From the interviews the researcher notes that 63% of the product managers are confused about which data is valid and reasonable to use for the forecasting procedure. Before starting the forecasts, 70% of the product managers individually discuss the database their forecast will be built on with the data scientists and/ or the controlling department. The more experienced product managers use the database they always used without aligning it with respective specialists. However, during the research in the observed company, the researcher discovered that the KPIs in their databases do not necessarily represent what the product managers think they represent.

Data gathering can become difficult due to different systems and different constraints. A huge amount of key performance indicators with similar naming but completely different meanings make it even more difficult. For example, the researcher recalls a discussion with about five

product managers about the differences between the net sales KPIs “NS A”, “NS B”, “NS C”, etc. The actual differences are that, for example, “NS A” includes net sales generated through fleet sales, whereas “NS B” includes net sales generated only through non-fleet sales but additionally includes net sales generated through reparations, and so forth. This discussion represents the confusion very well. Every KPI appears several times in the data warehouse together with a cryptic naming that does not give any hints for which factors could be included in the KPI. Additionally, there is a frequent change of these cryptic names and their definitions. Thus, a manual or dictionary for these terms would require an update at least every week.

In order to find a valid database with all necessary KPIs and additional information for all products of the respective business area, the whole data warehouse has to be searched together with the assigned data expert. The data expert makes the final decision on releasing the data for the business case tool or not. Here the importance of the expert roles becomes clear: In case the data expert is not fully into the project, it might happen that she will not do proper cross-checks. This can lead to a flawed business case tool.

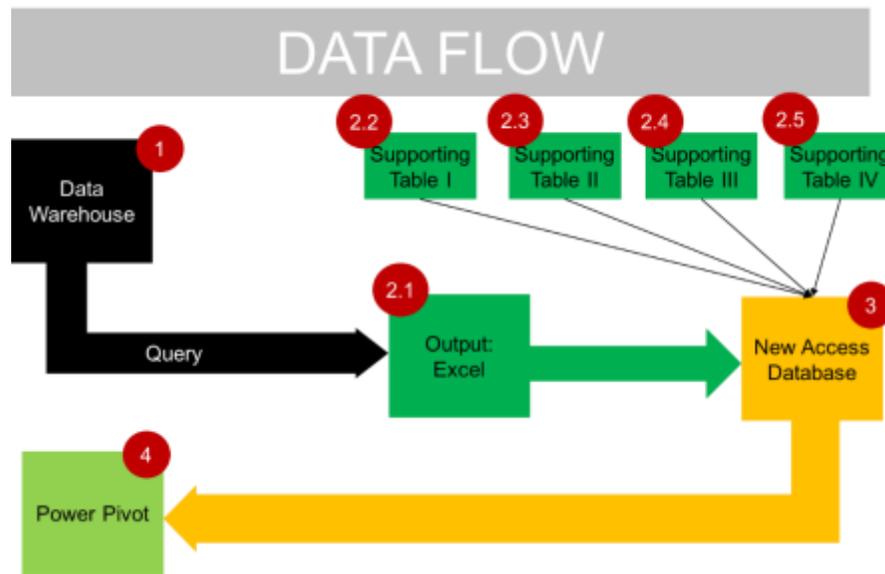
### 5.2.2 Data Handling

In order to make sure that forecasters will use the data identified as valid and not get back to the databases they used before, it is most target leading to directly include these in the standardized business case tool. Additionally, it becomes clear in the interviews, that the data gathering and validation is the most time consuming component of the business case development. One product manager mentions: “The business case development takes me about five days. Three days of these, I spent finding the right data.” Based on the interviews, 53% of the product managers report that they spend up to two days on data gathering while developing a business case, 35% of the product managers spend up to three days on data gathering and 12% of the product managers spend up to five days on data gathering. However, handling huge amounts of data and providing a fast and effective tool is a challenge which should not be underestimated. Allen and Fildes (2001, p. 306) recommend in their study on econometric forecast to “use all data unless this makes the model intractable.”

In the case this problem is solved by different databases in the back end, which are accessed with queries in the front end. Thus, the standardized business case is fast in usage, while calculations are made in the back end.

Figure 3 shows the dataflow in the back end. In step 1 and 2, the data is extracted from the warehouse with an Excel Add-in query. Due to the restriction of rows in Excel, several queries have to be run. The Excel data is forwarded to an Access database and structured with the help of supporting tables in step 3. These supporting tables translate cryptic names and codes from the data warehouse to more precise terms. The Access database is now, in step 4, loaded into the PowerPivot Add-in in Excel and thus feeds the Excel-based tool with data from the back-end.

Figure 3: Data Flow



### 5.2.3 Summary of Challenges in Data Gathering and Validation

The database challenges concern on the one hand the validation of the data and on the other hand the handling of the data.

In terms of validation, specialists who know the data warehouse all through have to be found and motivated for the project. In some circumstances it can be a long and time consuming journey of defining and finding the appropriate data. Thus, it is essential to have a persistent and motivated team on this journey.

In terms of data handling, the biggest challenge is to find a way of providing a fast tool that includes all necessary data. It is important to develop the data storage system in the beginning of the development process since it builds the basis of the tool.

## 5.3 Quantity Forecast

Profits are calculated by multiplying prices and quantities and subtracting costs. Quantities play a significant role in this calculation. Estimating future quantities thus is one of the backbones of a business case. In the forecasting literature, new product launches are regarded as most difficult to forecast (Chase, 2013).

In the case the bases of future quantity estimates are historical sales data. In forecasting literature, the aim of a new product forecast is defined by the prediction of future demand by looking at historical product data (Chase, 2013). Simplified, future quantities are deduced from the amounts sold of reference products or predecessors and enriched with individual assumptions depending on the new product. Kahn (2014) recommends forecasting methods for new products. Therefore, he compares existing product forecasts with new product forecasts and maps the determining differences. Whereas for existing products the quantitative database is the most important component of quantity forecasting, qualitative assumptions are the most important component of

forecasting a new product (Kahn, 2014). In the interviews of the present case, it became clear that the product managers hold the same view but distinguish between new products with direct predecessors and entire new products without predecessors or similar reference products. The business case in the observed company is only conducted for new products. However, in the decision process of new product launch, also decisions about similar existing products are made. This is further investigated in section 5.3.2 in which the interdependencies within a portfolio are further examined.

In the demand model as part of the decision model by Urban (1968), the basic input variable is the industry sales level of the new product in future periods. This is estimated with help of expected growth rates of similar existing products. However, they also point out that this method may be infeasible in order to estimate the quantity of a completely new product without similar historical data. They thus add lag functions to their model that measure the changes for future years according to absolute quantity amounts of the previous year. These lags should be estimated subjectively for products without existing reference product (Urban, 1968). In contrast, Kahn (2014) shows that these kinds of sophisticated stochastic models are very complex and difficult to use in practice. Further, Kahn (2002) points out that most literature on new product forecasting recommends using sophisticated statistical methods without explaining in which initial situations to use them and especially without explaining in which initial situations not to use them.

Only a few academic researchers empirically investigate new product forecasting and its accuracy in practice. Shelley and Wheeler (1991) took a closer look at high-technology products for personal computers. They find an average forecasting error of 21% in the first year after launch. Whereas in the second year the average forecasting error increases to 40% and in the third year after launch to 49% and so on. Tull's (1967) findings are even more disturbing. He investigates 16 firms with in total 53 products and finds a mean forecasting error of 53%.

In order to avoid as many forecasting errors as possible, the researcher decides to include a variety of forecasting approaches in the standardized business case tool.

### 5.3.1 Forecasting Approaches

The researcher deduces four main approaches for the quantity forecast:

- (i) Historical time series analysis
- (ii) Top-down
- (iii) Bottom-up
- (iv) Customer cluster

The historical time series analysis is used by every product manager (100%), the top-down approach is used by 64% of the product managers, the bottom-up approach is used by 58% of the product managers and the customer cluster approach is used by 35% of the interviewed product managers. All product managers use more than one approach in general. However, they do not use two or more approaches in every new product forecast. For example, one product manager mentions: "It depends on how innovative the product is. If it is just the successor of an existing product without extreme changes, I only look at the historical data. If it is a product we never launched before, I look from several perspectives."

Only a few researchers conducted surveys on the methods used by forecasters. Frank and McCollough (1992) have a closer look 290 finance officers of the U.S. government and find that 82% of these base their forecasting on judgment, 52% on trend lines, 26% on moving averages and 10% on exponential smoothing. Since forecasting methods have not been clearly defined (Armstrong, 2001), it is difficult to compare the findings of Frank and McCollough (1992) to the researcher's findings. However, judgmental methods are included in the top-down approach, the bottom-up approach and the customer cluster approach mentioned above. Whereas the other methods mentioned by the financial officers are in combination with historical data analysis. Rhyne (1989) investigates the forecasting methods in 40 hospitals and finds that 87% use judgments by a jury of executives, of which 67.5% use judgements by experts; 52.5% of the hospital managers use moving averages, 12.5% exponential smoothing and 35% use regression analysis.

#### *5.3.1.1 Historical Time Series Analysis*

For this forecasting approach, the leading question is: *How many units did we sell for a similar product and how did this develop over time?*

In the historical time series analysis, a predecessor or reference product is strongly needed. This product is quantitatively analyzed based on its sales data. Growth rates and development factors are calculated. It is also possible to identify sales peaks and collapses and their origins based on the data relation. Kahn (2014) suggests to connect the sales data with additional data such as weather conditions, natural catastrophes or holiday schedules in order to identify roots of anomalies.

It is not only important to analyze the quantities sold but also to analyze growth rates and other factors that influenced the development of sold quantities, such as cannibalization rates or synergy effects (these terms will be further explained in section 5.3.2).

Which factors to analyze heavily depends on the kind of product that is observed and the kind of new product that the analysis is made for. For example, in the observation of a predecessor for a direct successor, it is important to look at the growth rates and to analyze the reasons for how these developed. A product manager mentions: "In case I observe any anomaly in the quantities historical sold, I go deeper into that topic and try to find reasons why. If the quantities sold historically seem reasonable, I do not further investigate it and calculate with stable growth for the successor."

For entire new products it is nearly impossible to derive a quantity forecast just from an existing product. However, Kahn (2014) points out that the sales history of similar products can help in certain cases, but that there is no certainty that the history of a similar product can be applied to a new product. Therefore, this approach is most important and accurate in the forecasted amounts for new products with a direct predecessor.

#### *5.3.1.2 Top-down*

For this forecasting approach, the leading question is: *How many customers do we have and how many units of the new product do they need?*

Grauwe (2010, p. 465) contrasts the dynamics of the top-down and the bottom-up models and points out that “a top-down system is one in which one or more agents fully understand the system.” These agents can represent the whole system. In the present case, the customer is in focus of the top-down approach. The business customers are divided into their trades and size (potential) classes. For each trade and size class combination assumptions are made about how much of the new product they need in a certain time period (e.g., one year). According to Kahn (2014) these assumptions can be made through the combinations of expert opinions and predictions of executives. These assumptions depend on the lifetime of the new product. The lifetime again depends on the branch the customer is operating in. Thus, it has to be estimated how long a product lasts for a certain customer group.

Multiplying these assumptions with the amount of customers in each trade and size class combination leads to a quantity estimate for the aligned time period. In case a predecessor or reference product exists, the needed amount of products is deduced from the predecessor’s historical numbers.

The challenge here is to reasonably set the number of customers. It can be distinguished between

- (i) Total market
- (ii) Served market

**Total market.** The total market represents the total market demand for a product (or service). It is calculated in annual revenue or unit of sales if total market share (100%) of available market is reached (The Business Plan Shop, Online, last accessed: 18/08/2016). In case the aim is to generate new customers, it should be considered to look at the total market. Day (1981, p. 283) undertakes a strategic market analysis and points out that the definition of the total market required simultaneous consideration of the dimensions “customers, technologies and functions”. The estimation of the total market depends on how far the forecaster proceeds along each of these dimensions. The total market can be defined through one discrete category of each dimension or through a number of discrete categories of these dimensions (Day 1981).

**Served market.** The served market is the portion of the total market that is targeted by a firm and actually served by its products (or services) (The Business Plan Shop, Online, last accessed: 18/08/2016). In case the aim is not to generate new customers, but to increase satisfaction of existing customers, the served market of the company should be taken into consideration. The served market is a subunit of the total market defined through specific criteria of the three dimensions mentioned above: customers, technologies and functions (Day, 1981). For example, consider the case that the new product is only interesting for those customers that bought a certain existing product. The discrete categories in the dimension “customers” are all customers that bought the respective existing product. The discrete category in the dimension “technologies” is the respective existing product. The categories of the dimension “function” are the trade and potential classes of the customers that bought the respective existing product.

For products that cannot be assigned to one of these three options it is helpful to look at more than one customer group.

### 5.3.1.3 Bottom-up

For this forecasting approach, the leading question is: *How many products can be sold by one salesman in a certain time period?*

Grauwe (2010) defines the bottom-up systems as systems in which no individual understands the whole system. De Kluyver (1980) develops a bottom-up sales forecasting for a New Zealand printing and packaging company. He points out three steps of the bottom-up forecasting procedure practiced by a large number of companies:

- (i) Determination of regional sales forecasts in each selling region
- (ii) Aggregation of regional forecasts into an overall forecast
- (iii) Allocation of forecasted national sales over the production units of the company

The third step is not needed in the context of the case, because the observed company orders the products from the factories and thus does not plan the production units.

In the case each salesperson has one trade she is selling to. Thus, the forecaster may think about how many products a salesperson can sell in each region and each trade. In order to get this information, the salespersons themselves should be interviewed (Kahn, 2014). This represents step (i) listed above. In the case it is not only distinguished between regions but also between trades.

In step (ii) the estimates for trades and regions are aggregated to one estimate for the product. In addition, a reference product can be helpful for this estimate. The sales history of this product can be analyzed and broken down by single salesperson. Thus, this approach leads to a quantity estimate for entirely new products as well as for successors.

In their study, Herbig et al. (1994) find differences in forecasting behavior of industrial and consumer product companies by conducting a survey with 150 forecasting and marketing specialists. They find that the bottom-up approach is the most widely used in industrial companies. In contrast, from the expert interviews the researcher deduces that this quantity approach is seen as the least precise quantity estimate. This is due to salesperson tending to overestimate themselves or having insufficient expert knowledge on the new product yet. The overestimation tendency may come from the extrovert nature of salespersons and their fear of running out of stock. It is better for them to have too many products than too few.

Also it is enormously time consuming to interview a representative group of salespersons. In the case forecasts for five different markets are made. Thus, at least one salesperson of each trade of each market has to get an introduction into the new product and give an estimate of the potential sales amount.

### 5.3.1.4 Customer Cluster

For this forecasting approach, the leading question is: *Which customers will buy how much of the new product?*

The customer cluster approach helps to find the future quantities of new products that do not have any predecessor. Since this is the most difficult forecast (Chase, 2013; Kahn, 2014), it has to be conducted most carefully.

The aim is to define a customer group that will buy the new product with the help of existing products. For example, the new product is an attachment to an existing product. Thus, the main customer group for the attachment consists of the customers of the existing product that the attachment is for. Further, customers that own several products of the brand and previously bought new attachments can be considered. This approach is based on the market segmentation methodology by Tsai and Chiu (2010). They develop a segmentation method based on purchased items and associated monetary expenses. In contrast to the present study, they develop this segmentation method in order to reach a more homogenous response to marketing programs and not for forecasting purposes.

The amount of customers that have a high probability to buy the new product is extracted through constraints on generated net sales and/or bought quantities. For example, those customers that bought at least five units of the existing product within one year are considered to have the highest probability of buying the attachment. Or, those customers that generate yearly net sales of at least 10,000€ at the company, will buy this new product, because they prefer innovative products. Setting these constraints requires expert knowledge, not only about the technical features of the new product, but also about the customers and the competitive context.

Much attention has to be paid to the related internal products that are observed. In order to find a proper set of related products Chase (2013) suggests to look at the characteristics of the new product and compare these to existing products. The existing products with most similar characteristics can be taken into consideration for the observation. Therefore, each characteristic of the new product has to be known, elaborated and compared with all existing products. This, again, requires a high degree on expert knowledge about the new product as well as about all other products offered by the company and competitors. Different product managers, salespeople and engineers/ developers have to be consulted.

It becomes clear that this approach is the most hypothetical quantity forecast method. It heavily depends on how much expert knowledge can be gathered. In the academic literature, this kind of forecast is called *judgmental forecast*. A judgmental forecast is a forecast which is based on the subjective estimates of experts. According to Stewart (2001) every judgmental forecast is affected by inherent unreliability. This unreliability comes either from the information acquisition of the forecaster or from her information processing. The more complex the forecast, the less reliable the judgement. Stewart (2001, p. 81) finds five principles that decrease errors based on unreliability:

- (i) Organization and presentation of information in a form that clearly emphasizes relevant information
- (ii) Limitation of the amount of information used in judgmental forecasting
- (iii) Usage of mechanical methods to proceed information
- (iv) Combination of several forecasts
- (v) Justification of forecasts

However, also strictly following these five steps does not provide 100% accuracy of the forecast. It can only help improving the reliability.

### 5.3.2 Interdependencies within the Portfolio

The portfolio is of highest importance for product quantity forecasts. A product portfolio represents the competitive strengths of a company. A well composed portfolio leads to higher competitive value and more market share (Day, 1977). On the one hand it is important to observe influences of a new product launch on the whole product portfolio. On the other hand, whole portfolio hierarchy levels are launched at once and are forecasted at the same time. These two scenarios are further investigated in the following two sections.

#### 5.3.2.1 Influences on the Existing Portfolio

The product portfolio set up in the case is in hierarchal order sorted on various levels under the same brand name. Introducing a new product thus requires to look at how it will influence the existing products in the portfolio on a certain hierarchy level. A key task of the business case template is to provide guidance that helps to estimate the cannibalization rate on existing products and to define these products by choosing an appropriate hierarchal level.

Cannibalization here refers to the problem that customers buy a new product instead of an existing product and not in addition to an existing product. Heskett (1976, p. 581) defines cannibalization as “the process by which a new product gains sales by diverting them from an existing product.” Thus, the net profit generated through the new product has to be weighted with the lost net profit of certain existing products.

Contrary to cannibalization effects, synergy effects can appear. Synergy effects are desired effects and describe how customers buy additional products of the brand because they bought the new product. Shine et al. (2007) point out that synergy effects are restricted to products of the same company. In the case of synergy effects the net sales of the new product is an underestimation for the profit gain through the new product. This is because, the additional net sales of the synergy products are not included.

Estimating the impact of a new product is a critical management function (Chen and Yu, 2001; Kerin et al., 1978). Lomax (1996) points out that the risk of cannibalization gets more important in case new products are launched under the same brand name as existing products. The different hierarchy levels each sum up products with the same defined attributes. Let us assume there are five different levels:

- (i) Business Unit
- (ii) Product Line
- (iii) Product Family
- (iv) Product Type
- (v) Product

On Business Unit level products are separated roughly by their key functions. Each Business Unit consists of several product lines whereas each product line is defined by a certain characteristic. The Product Lines again are divided into several Product Families each with a different second characteristic. A fourth characteristic is summed up in Product Types and finally there is the individual Product. Each product is assigned to each of the four higher levels. In their quantitative study Ragharan et al. (2005) find that product attributes are the drivers of cannibalization. The

more similarities a new product has to existing products the higher the cannibalization effect. However, the extent varies between attributes and may cross different hierarchal levels (Ragharan et al., 2005).

#### *5.3.2.1 Launch of an Entire Portfolio Hierarchy Level*

From the expert interviews the researcher deduces that it is common to launch products of a type all together. A product manager points out: “When a new tool is introduced, it is offered in different sets and in different packaging. All the sets and different packaging represent the hierarchal level product type.” In this case the quantity forecast has to be done for a full product type. Herbig et al. (1994) find that forecasts on a higher hierarchy level than the product level tend to be more accurate. This means that in case a full type is launched, the forecaster should use the respective forecasting approaches for the whole type at once instead of investigating each product on its own. The experts in the case do not agree with this finding. The researcher finds that 52% of the interviewees forecast on product level whereas the other 48% forecast on a higher hierarchy level in case this is possible.

Here a standardized business case has to offer the opportunity to cluster on each hierarchy level. The predecessor or reference point is not one single item anymore but a full hierarchy level. The quantity forecasting approaches, however are the same. Tashman and Hoover (2001) suggest combining several forecasting methods when looking at the portfolio. The errors of forecasts with several methods are almost always smaller.

#### *5.3.3 Summary of Challenges in Quantity Forecast*

The major challenge in building a standardized quantity forecast is to offer the possibility to forecast all different products and hierarchy levels offered in the company. It is important to understand the techniques and suggestions in the literature and to implement these such that any potential new product can be forecasted.

Once approaches are gathered the challenge is to make the standardized forecast easy-to-use. More information does not necessarily lead to greater clarity. Thus, many approaches can lead to confusion of the forecaster. New forecasters have to be able to use this tool without knowing the company extremely well. It takes time to structure this part well and it needs some rounds of re-alignment. However, standardization does not make sense, when it is not used by the stakeholders due to its complexity. Thus, it is important to invest the necessary resources to keep it simple.

A further challenge is to take the portfolio dynamics into consideration. Looking at the profit a new product can bring isolated from how it will influence other products of the portfolio can lead to serious misestimation.

### *5.4 Price Forecast*

Next to quantity forecast, price forecast plays a significant role in order to estimate future profits. Price forecast is another backbone of a business case. In this section pricing strategies are presented and how these are applied to the price forecast in the observed company.

### 5.4.1 Pricing Strategies

Research has shown that the importance of pricing tends to be underestimated by company managers (Hinterhuber, 2008; Ingenbleek et al., 2003). Setting the right price for a new product is a complex task for a company. Hinterhuber (2008) points out that pricing has a major impact on the profitability. Researchers agree that the importance of pricing has also been underestimated in marketing research (Ingenbleek et al., 2003; Hinterhuber and Liozu, 2014; Kortge and Okokwo, 1993). According to the literature (Hinterhuber, 2008; Ingenbleek et al., 2003; Monroe, 1990), pricing strategies can be divided into three groups:

- (i) cost-based pricing
- (ii) competition-based pricing
- (iii) customer value-based pricing

The bases of cost-based pricing are production and service costs of a new product. This includes fixed costs as well as variable costs and reflects the bottom-line for the price alignment (Ingenbleek et al., 2003).

The bases of competition-based pricing are the competitors' prices of the benefit they offer. The evaluation of competitor prices according to their market position helps to assess the company's market position (Ingenbleek et al., 2003).

The basis of customer value-based pricing is the value that certain customer groups are gaining by acquiring the new product (Hinterhuber, 2008). This is quantifiable with the customers' willingness to pay (Ingenbleek et al., 2003). According to Varian (1992) the willingness to pay is the maximum price a customer is willing to pay for one unit of a product or service.

Kortge and Okokwo (1993) point out that (i) and (ii) belong to the traditional pricing methods. Here marketing managers mainly focus on costs, probability and demand. Cost covering is seen as the minimum requirement for price alignment. The customers' price sensitivity of demand is seen as the highest possible price. The probability of having the lowest price amongst competitors is seen as a medium price. Hinterhuber (2016) analyses pricing myths that kill profit and points out that the understanding of and focus on costs was traditionally an asset. Based on this, it now is treated as a liability without the attempt to search for more profit maximizing alternatives. Taking the customer into account in the pricing process is the most difficult approach and not widely used yet (Hinterhuber, 2008).

In the present case all three pricing methods are used. A product manager comments: "I base the new prices on past net sales and quantity data. Additionally, I figure out competitor prices and, if available, I look at the outcome of the customer acceptance test." The goal is to have the main focus on customer value. However, until now all strengths of this pricing method are not fully implemented, even though the technical prerequisites are set. A pricing manager interviewed by the researcher points out: "We are trying to change the product managers' way of thinking. [...] We want them to focus more on the prices the customers want to pay. This avoids uncontrollable discounts of the salesforce."

Ingenbleek et al. (2003) conduct a quantitative study with 78 product pricing commissioners of Belgian industrial firms and find that value-based pricing helps to find a price ceiling, especially

in case new product innovation is high and the product is thus less competitive. In their strategic pricing framework suggestion, Cannon and Morgan (1990) point out that value-based pricing is the most appropriate for profit maximization. These findings support the goal of focusing on customer-value based pricing.

From the interviews with product- and pricing managers at the observed company, the researcher deduces that the main problem is that product managers are not aware of the importance of customer-value based pricing and how to effectively use the existing customer information. A pricing manager comments: "They simply divide past net sales by past quantities for the mid-sized customers and assume this to be a good estimate for the new product." Hinterhuber and Liozu (2014) point out that companies do not focus enough on changes in pricing strategies and that they do not take the pricing strategy seriously enough. This partly underlines the researcher's findings in the present case. There are attempts of the management to change the pricing strategy, but not enough assertiveness to do so. This can be seen in the fact that there are several pricing tools for different product pricing situations (e.g., new products without predecessor or pricing restructuring of existing product portfolio hierarchies through introduction of a new product). These tools have never properly been introduced to the forecasters and no trainings were offered. A product manager answered to the question why these tools are not used while doing the business case is "I know these tools exist, but they are difficult to use and understand. I know my markets and customers and can reach a better estimate in a shorter time without these tools."

A study by Hinterhuber and Liozu (2014) finds that less than 5% of the overall world's companies have a chief pricing officer. In the present case a chief pricing officer and pricing managers in different hierarchical levels exist. This suggests that the management is aware of the value of pricing. However, from the interviews it becomes clear that the product managers are of the opinion that the willingness to change when it comes to pricing strategy is partly missing or even avoided due to structural reasons.

One obvious reason is that marketing managers are paid due to the net profit margin. A product manager points out: "The marketing managers mainly look at the profit margin, because they are paid according to it." Marketing managers have the last call for launching a product or not. Product managers present the estimations from the business case to the marketing managers, who decide pro or contra launch. In order to secure launch, the profit margin plays a determining role. In practice this leads to price alignment through the cost-based method. In order to find a trustworthy margin, the easiest method is to take costs and add a certain target margin. Cannon and Morgan (1990) point out that in this pricing method, demand is seen as relatively inelastic. This makes it clear that a simple cost-plus margin method cannot be precise enough for every kind of product.

Further, it becomes clear that competitor prices significantly influence the product prices. The competitor product is compared with the company product and, with rough value estimations of differences, a price for the new product is deduced. A product manager mentions in the interview: "Usually I know everything about the new product and I know the competitors' products, so I can estimate the value add. I even sometimes compare the products in real live to have a narrow as possible idea about the value add (or loss). In other cases, I also call customers I know and trust. I

know they will give me trustworthy estimate.” These value estimates are a first step into customer-value based pricing.

In his quantitative study Hinterhuber (2008) finds reasons why companies do not implement customer-value based pricing. To begin with, there are the difficulties in assessing the (additional) value for the customers. He provides guidance for how to assess the customers’ perceived value. Amongst others, he suggests conducting expert interviews with expert customers and interviewing groups of customers at once in order to assess the value of a new product.

In the present case, the so-called customer acceptance test is implemented in order to understand the customer value. This is especially conducted for entire new products and for existing products that have a significant decrease in sales for no apparent reason. In the customer acceptance test, a customer gets to use different products without any brand name. After trying these, she is asked to fill in a survey containing questions about technical features, improvements and an acceptable and maximum price. From the interviews and experience in the company, the researcher observes that the price estimates in these acceptance tests are not only seen positively by the product managers. This is because the case company has only business customers. On the one hand, those employees of the customer businesses that use the product, do not necessarily know the customary market prices. On the other hand, those employees that are responsible for purchasing do not value innovations as high as those employees that are using the products. This can potentially lead to unrealistic price estimates in the customer acceptance tests. Here an additional factor is that the case company is a premium brand with premium prices. A product manager comments: “I don’t like to rely on the customer acceptance tests only, because they want to drop the price or do not have any idea of the given value. Additionally, the survey contains so many questions about the product itself and the prices that the customers just want to finish it and do not properly think about it anymore.” Thus, it is critical to regard the outcomes of the customer acceptance test per se in a standardized price forecast.

As mentioned above the observed company operates business-to-business (B2B). The customers are divided into their sizes (potential) and trades they are operating in. The case distinguishes between seven trades and five size classes. The basis of pricing is creative discounting. This discounting is also suggested by Hinterhuber and Liozu (2014) as one step toward innovation in pricing. Each size class / trade combination has its own discount on the list price of a certain product. For each product group a separate discount structure applies. Additionally, the salesforce has the opportunity to lower prices for aggressive customers. This, on the one hand generates net sales through customers that would not have bought for their regular discount price. On the other hand, it is difficult for the salesforce to set a bottom line and to post-evaluate the accuracy of the pricing of an existing product. Thus, price forecasters tend to analyze the prices of reference products or predecessors according to the average net sales price, simply calculated by net sales divided by quantities. Typically, a value add for innovations of the new product is added based on expert experience of the forecasters. From this new average net sales price, a list price for the new product is deduced.

A price estimation like this is not necessarily profit maximizing. The salesforce does not have any restrictions of how much to lower the prices, but they gain a performance driven salary. This is to

ensure that they do not lower the prices arbitrary. Farley (1964), for example, develops an incentive method by defining a commission rate policy that encourages the salesforce to reach the same goals as the ones of the company. The salesperson here is seen as an income-maximizer and this makes him maximizing profit for the company under performance driven salary. However, the additional discounts significantly lower the average net sales price. Relying only on this average net sales price in the price decisions for new products might dilute the outcome. A pricing manager points out: “The average net sales price does not help in the price setting of new products. This is what the product managers have to understand. We lose a lot of potential profit by setting the prices according to the average net sales price.” What he meant will be further investigated in the following section.

#### 5.4.2 Moving the Focus to Customer Value

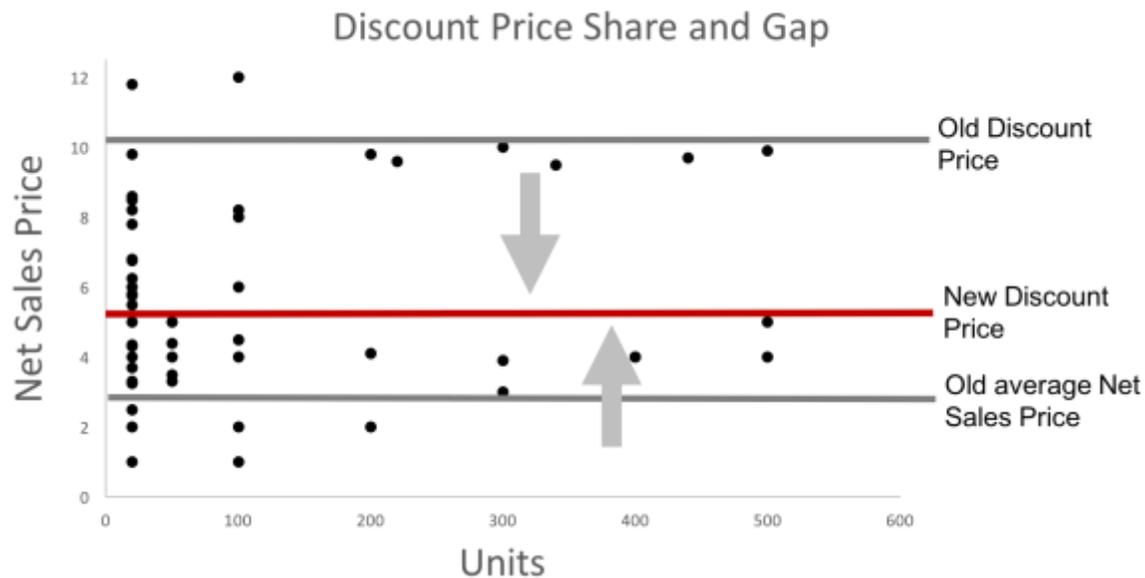
In order to reach a more customer-value based and profit maximizing price estimate, the focus has to move toward the discount price. The task is to set a high enough discount price in order to exploit the willingness to pay of the majority of the customers and to set the discount price low enough to avoid additional discounts through the salesforce. Thus, next to the average net sales price, the average discount price and the share of sales on discount price have to be observed. In order to have as many buying customers as possible, the discount price share has to lie in a certain range. Thus, it is possible to gain the customers that are willing to pay a higher price and to gain the customers that have the willingness to pay of a lower price.

Let us look at an example. A company set a discount price of 100€ for a new product. 55% of the buying customers were willing to pay 100€ or more for the product and 45% of the buying customers were willing to pay less than 100€. The discount price share is 55%. 55% of the customers paid the actual aligned discount price and 45% bought the product with an additional discount set by the sales force.

Simply looking at the discount price share and average discount price does not sufficiently represent the customers' value perception of the reference product. Therefore, the average net sales price of non-discount price sales has to be analyzed. The gap between this average net sales price and the average discount price in combination with the discount price share reflect the overall customer willingness to pay. The smaller the gap, the higher the discount price share and vice versa. This is visualized in Figure 4. The dots represent the willingness to pay of the customers. The old discount price is at the upper gray line and the old average net sales price is at the lower gray line. The gap between these two lines is big, looking at the overall distribution of dots. With this old discount price, the customers (dots) between these two lines pay the old average net sales price, even though their willingness to pay is almost at the old discount price. The dots above the old discount price, pay the old discount price and the dots under the old average net sales price do not buy at all. Pushing the new discount price down (visualized by the red line) shrinks the gap between old average net sales price and discount price. This means that now the customers between the red and the upper gray line all pay the new discount price, which is still above the old average net sales price. This has a positive effect on profits. However, also the customers that initially had a willingness to pay above the old discount price will now only pay the new discount price, which

has a negative effect on profits. This shows that the difficulty is in aligning the discount price such that profit is maximized.

Figure 4: Discount Price Alignment



These insights bring the price alignment of a new product to a whole new level. As mentioned above, the forecaster now sets the new discount price and not the average net sales price. After analyzing a reference average discount price, discount price share and gap between the non-discount price net sales price and discount price, the new discount price can be set more precisely according to the customers' willingness to pay. In case discount price share has been low for the predecessor, the discount price for the successor will be set lower, depending on the gap. This leads to more customers with a lower willingness to pay, without losing existing customers. In case the discount price share has been high for the predecessor, the discount price for the successor will be set higher. This leads to fewer or the same number of customers paying more. In both cases the probability of raising profits increases.

In the predecessor/ successor scenario this pricing method is fully applicable. In case there is no direct predecessor or comparable reference product, customer-value based pricing gets more difficult. All customer value information has to be taken from the customer acceptance tests mentioned above and the expert knowledge of the forecasters. Here a mixture of all three pricing methods (cost based, competitor based and customer-value based) is helpful. Chase (2013) suggests to start with simple basic customer value. This is because customers need time to explore the value of the new product first and understand how to properly use it. They are confused by many new features and find the handling in the beginning complicated. Customer value estimates helps more over time during the development of a product (Charles, 2013). Based on this, and the comments of the product managers' opinion about the customer acceptance test mentioned above, the researcher deduces that the expert knowledge of forecaster, salespersons and other experts is highly important in estimating the customer value.

Hinterhuber (2016) summarizes examples of companies that switched from cost-based pricing to value-based pricing. He points out that even big companies such as the luxury apparel retailer Hugo Boss and one of the world's biggest companies Nike only recently switched from cost-based to value-based pricing. For both companies, analysts assume that recent profitability increases are based on this change (Hinterhuber, 2016).

Once the price for a new product is set, all-inclusive and rental package prices can be deduced. The monthly fees for the rental all-inclusive package are deduced from the list price of the rented product plus standardized fees for services and insurances such as theft insurance. Since the monthly fees depend on the list prices to a significant amount, a proper list price estimate is also the basis for a proper rental fee. The determination of these prices is not in the area of responsibility of the product managers and thus not explicitly part of the business case. However, in order to forecast a proper profit, an estimate has to be assumed. Previously the average historical fleet price has been taken as an estimate. Now the fraction between list- and average fleet price is taken. This is just to be able to reach an accurate profit forecast. In the pricing of these all-inclusive and rental packages, it becomes clear that there are many instances, independently of each other, involved in pricing process.

Hinterhuber (2016) also points out this problem. He finds out that in many companies pricing is the responsibility of so many people on different levels in a company's hierarchy at the same time, that in the end nobody feels responsible for it. The researcher finds this problem especially in terms of package pricing in the case company as well. One product manager mentions, "For my market, I align the package prices according to a certain tool." Another product manager points out, "I do not assume package prices, since this is done by a certain department according to the list prices." These two different opinions mirror the answers to package pricing in the interviews in general.

#### 5.4.3 Summary of Challenges in Price Forecast

The first challenge in developing a standardized price forecast in the company as well as in the literature is to thoroughly understand the current pricing methods. Further, it is important to understand the difference between how price forecasting is done today and what the management goals for future price forecasting are.

Not every pricing theory can be applied in a standardized tool. However, it is possible to find aspects that can be changed in order to reach the goal of profit-maximizing pricing.

A further challenge is to get everyone—stakeholders, experts and management--on board for new ideas. Communication plays a significant role in this.

#### 5.5 Summary of Challenges

In this section, 12 challenges in 4 categories are presented by the researcher based on an analysis of the findings from the empirical data-gathering. Figure 5 shows categories and challenges described above.

Figure 5: Categorization of the Challenges of Business Cases



To sum it up, in every category it is important to communicate with specialists and stakeholders. It is important to motivate and encourage everyone who is involved in the process. Further, all methods and processes behind the business case have to be fully examined and understood. Intersection points have to be found and a basis for standardization has to be set. Potential for improvement can be found with the help of the academic literature. Finally, all ideas have to be connected and the different components of the standardized business case have to be aligned.

Figures 6 and 7 show the structure of the standardized business case model developed in this chapter. In Appendix B2 the mathematical implementation of the standardized business case model is presented.

Figure 6: Structure of Business Case Tool (1)

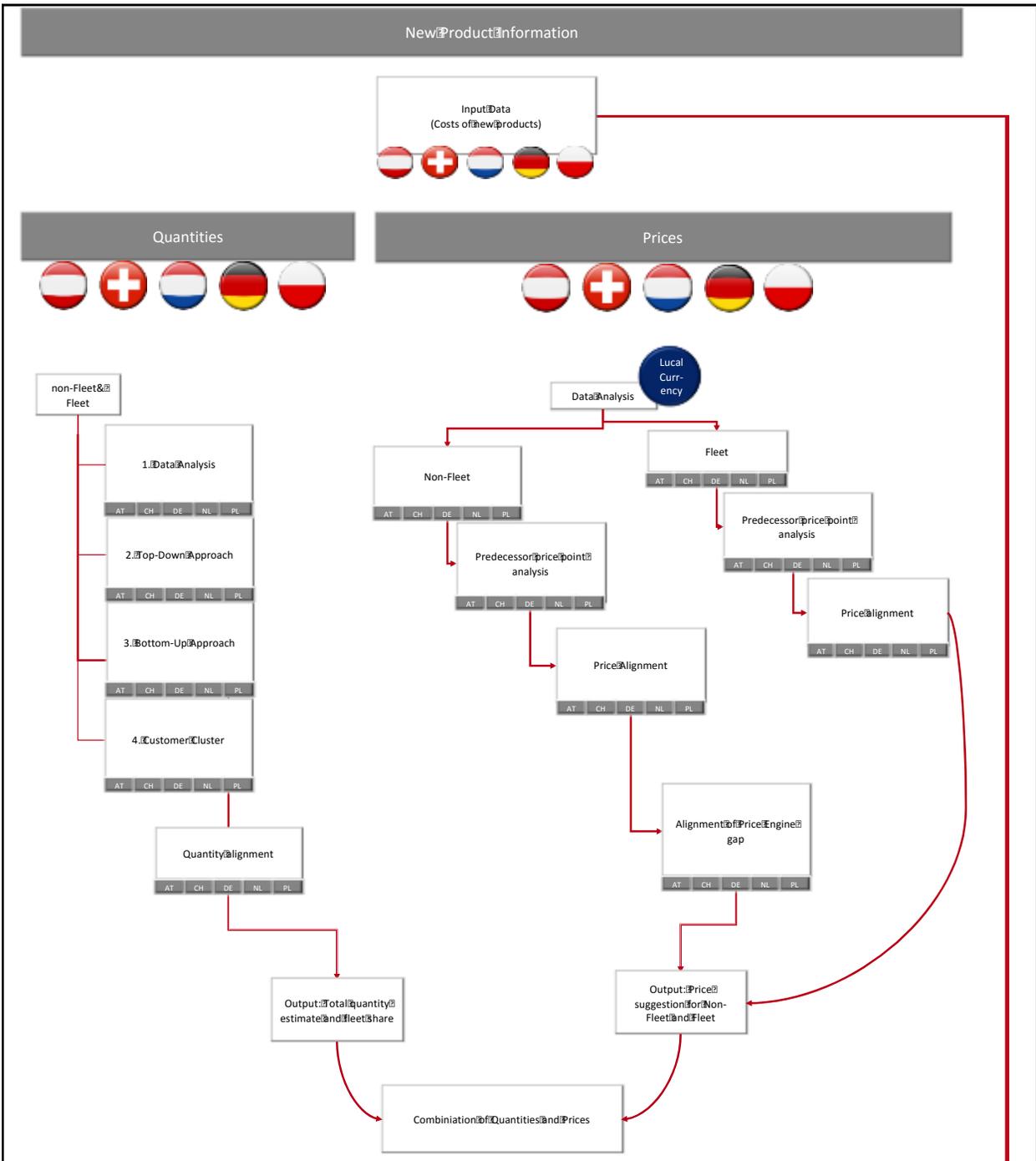
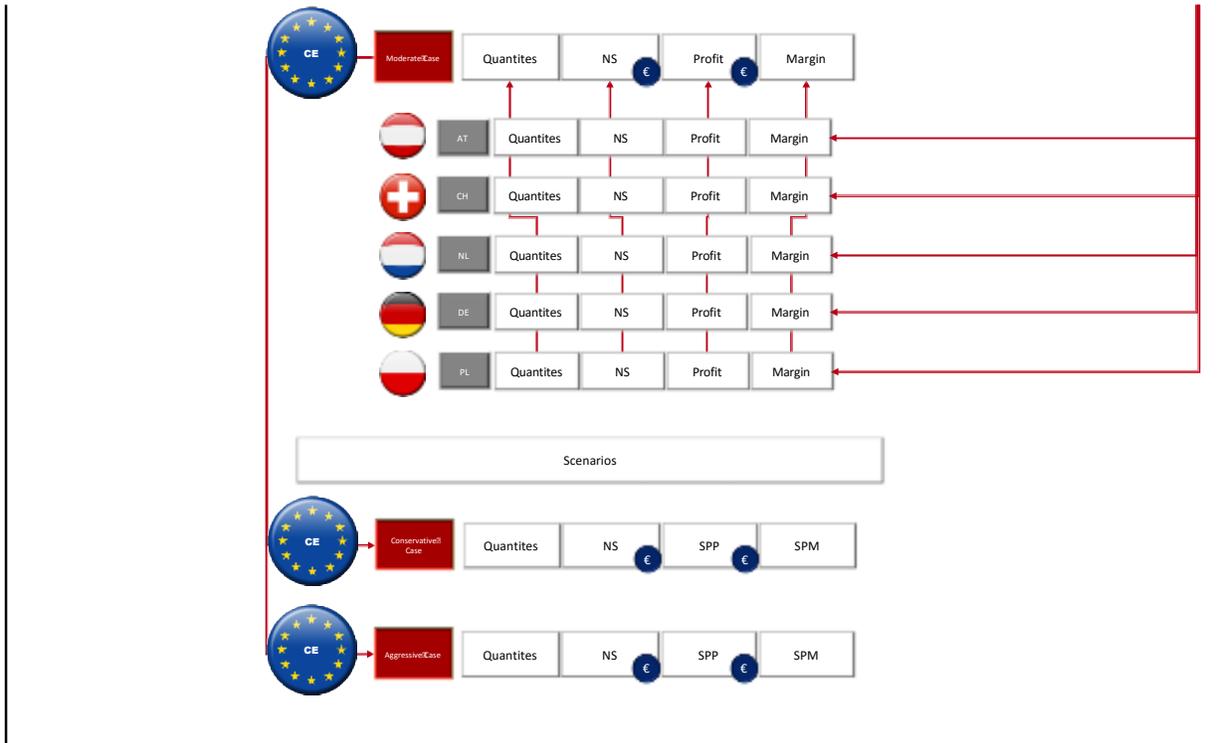


Figure 7: Structure of Business Case Tool (2)



## 6 Conclusion

This chapter sums up the outcomes of the present study and gives suggestions for future research.

### 6.1 Outcomes

In the present work the challenges in the development of a standardized business case tool for new product launch at a large company are categorized. The categories, developed by the researcher in the course of the project, are: process and team, data gathering and validation, quantity forecast and price forecast. Figure 8 shows all challenges found in this study.

Figure 8: Clustered Challenges found in this Study

Process & Team	Data Gathering & Validation	Quantity Forecast	Price Forecast
<ul style="list-style-type: none"> <li>• Define experts and departments involved in the process</li> <li>• Motivate experts and stakeholders</li> <li>• Align steps with stakeholders, experts and the senior management</li> </ul>	<ul style="list-style-type: none"> <li>• Assign and motivate data scientist</li> <li>• Find and define appropriate data</li> <li>• Provide a fast tool that includes all necessary data</li> </ul>	<ul style="list-style-type: none"> <li>• Provide the possibility to conduct the quantity forecast for the different kinds of products offered by the company</li> <li>• Provide an easy-to-use tool for the forecasters</li> <li>• Provide insights into the effects on the product portfolio</li> </ul>	<ul style="list-style-type: none"> <li>• Understand pricing methods presented in the literature and the management pricing goals of the company</li> <li>• Accept that not all pricing methods are applicable for any company and find applicable pricing methods</li> <li>• Get the right people on board for new ideas</li> </ul>

For each challenge, approaches to solutions are presented. One innovative finding is the composition of the quantity forecast of four easy-to-use approaches. These approaches make it possible to forecast completely new products and successor products on product item level and on any other portfolio hierarchy level. The historical development of a reference or predecessor group can be observed, the customer potential and the respective penetration rate can be forecasted, the salesforce view can be taken into consideration and a group of customers that has a high probability of buying the new product can be extracted.

Another finding is the application of customer value-based pricing with focus on profit-maximization in the frame of creative discounting. Prices are aligned according to the customers' willingness to pay by analysis of what they were previously willing to pay for a predecessor or reference product. With the utilization of creative discounting, the price alignment aims at minimizing the difference between what a customer is maximally willing to pay and what she actually pays.

The present study contributes to the academic research field of business case development for new product launch by offering a holistic view of all elements of a business case for new product launch. Previous research has mainly focused on single topics inside the business case such as price forecasting or quantity forecasting. Thus, the present study enriches the academic literature by offering findings concerning the whole process of developing a business case for new product launch for a large industrial mining and construction company; including data gathering, price forecast and quantity forecast.

## 6.2 Future Research

Based on an extensive literature review, the researcher discovered that little academic research has been conducted in the topic of business cases for new product launch yet. Forecasting literature typically focusses on one aspect, either quantities or pricing. In the forecasting literature several sophisticated stochastic approaches are developed. However, these approaches are typically not tested in companies and are not necessarily applicable to a business environment. Forecasters of new products in an industrial company typically do neither have the time nor the stochastic knowledge to accurately use these sophisticated methods. Thus, a suggestion for future research is to further investigate and develop forecasting approaches that are applicable for companies. A research question could be: *How to set up price and quantity forecast as accurate and as easy as possible to be used in an industrial company?*

Also the dynamics between price and quantity forecasting are suggested to be further researched. A lot of microeconomic literature focusses on the dynamics between demand and prices. However, how to predict these for new products in an industrial environment is hardly investigated yet. A proposed research question for future research is: *How to analyze and forecast the dynamics between prices and quantities for a new product before launch?*

The present case study gives an inside for the niche of a large industrial mining and construction company. Future research might focus on similarities or differences to other industries or test the findings of the present study on different companies. The research question of the present study can be rewritten for other industries and companies.

Another proposed research topic for future research is to investigate the accuracy of business cases for new product launch in a certain industry. The forecasting literature did hardly focus on the actual precision of the proposed forecasting methods in reality. A proposed research question for future research in this topic is: *How accurate are predictions in business cases for new product launch [in a certain industry]?*

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## Appendix A: Pre-prepared Interview Questions German and English

No.	Fragen Experteninterviews	Questions Expert Interviews
	Thema: Business Case Kalkulation	Topic: Business Case Calculation
<b>1</b>	<b>Historische Daten</b>	<b>Historical Data</b>
1.1	Benutzen Sie eine einzige Query um alle historischen Kennzahlen zu extrahieren? Wenn ja, welche?	Do you use one unique query to generate the historical values? If yes, which one?
1.2	Lassen Sie die Query/ Queries selber laufen oder haben Sie einen Ansprechpartner, der Ihnen die Daten gibt? (z.B. im Controlling)	Do you run the query/ queries by yourself or do you ask someone else for the data? (e.g.: Controlling)
1.3	Wie viel Zeit verbringen Sie durchschnittlich damit (i) Daten zu finden, (ii) Daten zu strukturieren und (iii) Performance Indikatoren (KPIs) zu berechnen?	How much time do you spend in average on (i) sourcing data, (ii) structuring data and (iii) calculating key performance indicators (KPIs)?
1.4	Welche Queries benutzen Sie für die historischen <b>Net Sales</b> ?	Which queries do you use for historical <b>net sales</b> ?
1.5	Was beinhaltet Ihre Net Sales Query? Welchen Net Sales Wert nehmen Sie? (z.B.: NS70, NS r12, NS Copa, NS Fleet, etc.)	What is included in your net sales query? Which net sales value do you take? (e.g.: NS70, NS r12, NS Copa, NS Fleet, etc.)
1.6	Benutzen Sie verschiedene Queries um spezifische Pricing Daten zu extrahieren oder sind die Pricing Daten ein Ergebnis Ihrer NS Analyse?	Do you use different queries to extract specific pricing data or is pricing data a result of your NS analysis?
1.7	Wie berechnen Sie den historisch gewachsenen Durchschnittspreis?	How do you calculate the historical average prices?
1.8	Welche Queries benutzen Sie für die historischen <b>Mengen</b> ?	Which queries do you use for the historical <b>quantities</b> ?
1.9	Was beinhaltet Ihre Quantity Query? Welche Quantities nehmen Sie? (z.B.: QTY70, QTY r12, QTY Copa, QTY Fleet, etc.)	What is included in your quantity query? Which quantities do you take? (e.g.: QTY70, QTY r12, QTY Copa, QTY Fleet, etc.)
1.10	Welche Queries benutzen Sie für die historischen <b>Strategischen Produktmargen</b> ? (z.B.: Item Level, Combo Level, etc.) <b>(SPM in %)</b>	Which queries do you use for the historical <b>strategic product margins</b> ? (e.g.: Item level, Combo level, etc.) <b>(SPM in %)</b>
1.11	Welche Queries benutzen Sie für die historischen <b>Strategischen Produktkosten</b> ?	Which queries do you use for the historical <b>strategic product costs</b> ?
1.12	Welche Queries benutzen Sie für die historischen <b>Preise</b> ?	Which queries do you use for the historical <b>prices</b> ?

1.13	Welche Performance Kennzahlen (KPIs) berücksichtigen Sie? (z.B.: ZGPD Preis, Vorschlagspreis, Überschreibung)	Which key performance indicators (KPIs) do you take into consideration? (i.e.: ZGPD price, agreement price, overwrite price)
1.14	Analysieren Sie die Nutzung des ZGPD Preises? (Anzahl der Verkäufe, die über Vorschlagspreise, Rahmenverträge bzw. Überschreibungen abgewickelt wurden)	Do you analyze ZGPD usage? (i.e.: utilization of price engine - amount of sales that is running through GPD agreements and overwrite)
1.15	Bis auf welche IPC Ebene gehen Sie typischerweise runter? Gibt es Unterschiede zwischen den Produkten? (bspw. zwischen Consumables und Inserts)	Into which IPC Level do you usually break down? Are there differences between the products?
1.16	In wie weit spielt der Loyalitätsstatus der einzelnen Kunden für Sie eine Rolle? Wie definieren Sie diesen?	Does the loyalty status play a role in your calculations? How do you define it?
1.17	Was ist in Ihrem vorgeschlagenen Preis enthalten? (z.B.: Logistikkosten, Combo, etc.)	What is included in your proposed price? (e.g.: Logistics, Combo, etc.)
1.18	Die historischen Werte wie vieler Jahre werten Sie aus?	How many years of historical values do you evaluate?
1.19	Analysieren Sie verschiedene Segment- und Potentialunterschiede?	Do you analyze certain trade and potential differences?
<b>2</b>	<b>Forecast: Preise</b>	<b>Forecast: Prices</b>
2.1	Welche Performance Kennzahlen (KPIs) berücksichtigen Sie um einen präzisen Preisvorschlag zu machen? (z.B. Listenpreis, E- Preis, etc.)	Which KPIs do you take into consideration to come up with a proper price recommendation? (e.g.: list price, E - price, etc.)
2.2	Holen Sie Preisinformationen von dem Vertrieb ein? (z.B. C- und E- Preise des Wettbewerbs)	Do you seek any price information from the sales force? (e.g. competitor C - and E - prices)
2.3	Welchen Preis analysieren Sie? (z.B.: Durchschnittspreis, Vorschlagspreis oder Mix aus Rahmenverträgen, Überschreibungen, bestimmter Potentialpreis, etc.)	Which price do you analyze? (e.g.: average price, suggested price, basic agreements, overwritings, a certain potential price etc.)
2.4	Rechnen Sie alles in einer einheitlichen Währung?	Do you calculate everything in the same currency?
2.5	Welche Exchange Rate verwenden Sie?	Which exchange rate do you use?
2.6	Wie berechnen Sie den zukünftigen ANSP?	How do you calculate the future ANSP?
2.7	Wie berücksichtigen Sie Flottenpricing?	How do you consider fleet pricing?
2.8	Welche Personen sind in dem Prozess des Item Set-ups involviert? (z.B. nur Produktmanager, Strategisches Marketing, Material Manager, etc.)? Wer ist der Process Owner?	Which roles are involved in the process of item set up (only product management, strategic marketing, material management)? Who is the process owner?

2.9	Wer hilft Ihnen bei der Abschätzung der Listenpreiserhöhung? Wie ordnen Sie Preiserhöhungen den entsprechenden Produkten zu? Welche Daten betrachten Sie bei der Entscheidungsfindung?	Who approaches you with list price increases? How do you assign increases to respective items? What data do you take into consideration for decision making?
2.10	Berücksichtigen Sie die historische Listenpreisentwicklung bei der Entscheidung über die Preissetzung im INP Jahr?	Do you consider the historical list price development in the decision process of the price setting in the INP year?
2.11	Wie schätzen Sie die Erhöhung des Listenpreises ab?	How do you estimate the increases in list prices?
2.12	(Wie schätzen Sie die Pull-Through Rate der Erhöhung des Listenpreises ab?)	(How do you estimate the pull-through rate of the increases in list prices?)
2.13	Sind Sie mit dem CAGR (Compound Annual Growth Rate) Konzept vertraut?	Are you familiar with CAGR (Compound Annual Growth Rate) concept?
2.14	Wie bringen Sie die durchschnittliche jährliche Wachstumsrate der Listenpreise (CAGR) in Ihren Preis-Forecast ein?	How do you include the compound annual growth rate of list prices into your price forecast?
2.15	Wie schätzen Sie die SPC Senkung ab?	How do you estimate the SPC decrease?
2.16	Mit wem stimmen Sie den Preisvorschlag ab? Trade Manager? Marketing Manager? Andere PMs (BU/HUB/MO)?	Who do you coordinate your price suggestion with? (e.g.: Trade Manager, Marketing Manager, other PMs (BU/HUB/MO), etc.)
2.17	Werden Sie durch bestimmte Preisschranken/ Preiswahrnehmungen von Kundenseite beschränkt?	Are you restricted due to price barriers/ price perceptions of customers?
<b>3</b>	<b>Forecast: Menge</b>	<b>Forecast: Quantities</b>
3.1	Woher bekommen Sie die Wachstumsraten? (z.B.: Queries, andere Informationen, etc.)	Where do you get the growth rates from? (e.g.: queries, other information, etc.)
3.2	Mit welcher Art von Wachstumsraten rechnen Sie? (höhere Mengenzahl und niedrigere Marge oder höhere Marge und niedrigere Mengenzahl)	With which growth rate do you calculate? (i.e.: gain higher quantities with lower SPM or gain higher SPM with lower quantities)
3.3	Nehmen Sie eine Art Kundensegmentierung vor? (z.B.: anhand der Verkaufshistorie)	Do you undertake some sort of customer segmentation? (e.g.: according to sales history)
3.4	Welches Modell benutzen Sie um zukünftige Mengen abschätzen zu können? (Bottom-up, Top-down)	Which model do you use in order to estimate future quantities? (i.e.: bottom-up, top-down)
3.5	Wie bringen Sie die durchschnittliche jährliche Wachstumsrate (CAGR) in Ihren Mengen-Forecast ein?	How do you include the compound annual growth rate into your quantity forecast?
3.6	Wieviel Jahre rechnen Sie den Business Case in die Zukunft?	How many years in the future do you calculate the Business Case?

3.7	Rechnen Sie einen Safety Stock, Van Stock, HC Pipelinefill mit ein?	Do you include a safety stock, van stock, HC pipeline fill in you calculation?
<b>4</b>	<b>Allgemein</b>	<b>General</b>
4.1	Was ist Ihnen allgemein besonders wichtig bzgl. Business Case Kalkulation?	What is particularly important to you regarding business case calculation?
4.2	Was muss Ihrer Meinung verbessert werden bzgl. Business Case Kalkulation?	What is in need of improvement to your opinion?

## Appendix B1: Mathematical Implementation – List of Symbols

### General

a	Fraction of list price a customer pays
AC	Overall amount of respective customers
aNSP	Average net sales price
ASP	Amount of additional sales persons
AT	Amount of teams
b	Fraction of quantities that are sold to a customer
CAGR	Compound annual growth rate
CU	Amount of customers in customer universe
C	Cost
d	Discount
$\delta$	Development factor
EC	Amount of customers of existing customer group
f	Fraction between PF and LP
$\eta$	Discount pricing share
g	Gap (between PD and aNSP)
$\gamma$	Market penetration rate
l	Relation between list- and average fleet price
LP	List price
LPi	List price increase
n	Amount of reference products
NS	Net sales
PD	Discount price
PF	Fleet price
PM	Net profit margin
$\Pi$	Profit
$\varphi$	Fleet share
q	Quantity
qSP	Quantity 1 sales person sells

SP	Amount of sales persons
SPC	Strategic product costs
$\tau$	Additional discount pricing share
TY	Amount of teams per trade per year
x	Growth rate
v	Trade distribution
$\zeta$	Pull-through rate

### **Superscript indexes**

Ag	Agreements related
AT	Austrian market related
C	C-customers related
CE	Central Europe related
CH	Swiss market related
DE	German market related
E	E-Customers related
F	Fleet related
T	Total
L	Non-fleet related
NL	Dutch market related
Ov	Overwrites related
PE	Price engine related
PL	Polish market related

### **Subscript indexes**

i	Serial number for size classes
j	Serial number for trades
k	Serial number for reference products
ly	Launch year related
t	Year

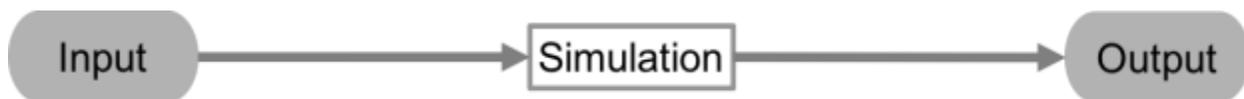
## Appendix B2: Mathematical Implementation – The Model

In this chapter the model of the standardized business case for new product launch is presented and expressed mathematically. The methods aligned in chapter 5 are now implemented into a tool.

### B2.1 Building a model

A model consists of three parts: Input data, the simulation process and the output (Micouin, 2014).

*Figure 9: Structure of a Model according to Micouin (2014)*



In the standardized business case model, the input data are the historical sales data extracted from the data warehouse of the observed company and expert estimates. The simulation process is the forecasting procedure. The output are the estimates for future profit and profit margins.

### B2.2 Data

The data, the model is built on, is gathered from the observed company's data warehouse and has to be updated frequently in order to provide newest numbers and increase the reliability of the forecast. Each sales transaction is evaluated from June 2013 to June 2016 for five different countries in Europe. The data includes the following indicators:

- I. Quantities
  - a. Total sold quantities
  - b. Fleet sold quantities
  - c. Non-fleet sold quantities
- II. Net Sales
  - a. Total net sales
  - b. Fleet net sales
  - c. Non-fleet net sales
- III. Pricing
  - a. List prices
  - b. Discount channel
  - c. Discount
- IV. Products
  - a. Hierarchy levels
- V. Customer
  - a. Customer ID
  - b. Size class
  - c. Trade

Additionally, information about the total market in these five countries (amount of all potential customers, their trades and size classes) and the amounts of salesperson operating in the different trades has been gathered and considered.

### B2.3 The Model

The model aims to maximize the core function

$$\Pi = p^c * q^T - c, \quad (1)$$

*with  $\Pi$  representing profit,  $p$  representing a compound price,  $q^T$  representing total quantities and  $c$  representing costs.*

The respective net profit margin function is

$$PM = \frac{\Pi}{NS}, \quad (2)$$

*with  $PM$  representing the net profit margin and  $NS$  representing the net sales.*

The core part of the developed model helps to find input values for the parameters of this function. In order to reach this goal, the model is separated into three segments:

- (i) General input data on central Europe level
- (ii) Quantity forecast
- (iii) Price forecast
- (iv) Case predictions

In (i) the given costs of the new product are inserted, in (ii) quantities are forecasted and in (iii) prices are forecasted. In (iv) All three variables come together and net sales, profit and profit margin is calculated.

The following sections give deeper insights into these four segments.

#### B2.3.1 General Input Data on Central Europe Level

In the observed company, information about product costs, product names and their internal specification codes are firstly distributed to the central Europe product managers only. They are in charge to distribute this information to the market organization product managers. In order to save time and bureaucratic afford, this is done through the tool. Thus, in the first step, the central Europe product manager has to fill in specification codes, names and costs (on product level) of the new products. She additionally updates the current exchange rates from Euro to Swiss Francs and from Euro to Polish Zloty. This information is not only necessary to calculate future profit, but also to make sure that all market organizations are preparing the forecast for exactly the same products on the same product hierarchy level.

### B2.3.2 Quantity Forecast

Following the application of the four quantity approaches presented in section 5.3 is presented. In all approaches an analytical framework is given and suggestions are made. However, the subjective estimation of the forecaster based on her professional experience can also be regarded and even is necessary in certain cases.

It is not appropriate to prepare all four approaches in every case. This heavily depends on the new product, its innovativeness and the existence of predecessors.

#### B2.3.2.1 Historical Time Series Analysis

In a first step the forecaster chooses up to 9 existing products or hierarchy levels that she sets to be relevant to the forecasted product. Based on the historical sales data in the regarded time period of these products or hierarchy groups, the forecaster inserts her subjective estimate of a development factor ( $\delta$ ) for each year from launch year ( $ly$ ) to the fourth year after launch ( $ly+4$ ). The tool suggests to regard a cannibalization factor, stable development and/ or a boost factor as a result of initial marketing campaigns for the new product launch. A cannibalization factor should be considered in case the investigated existing product will still stay in the market after the new product launch and has sufficient enough similar attributes to be substituted by the new product. This factor typically is between 0 and 1 and expresses the fraction of quantities that will be taken from the respective existing product. In case the existing product will be phased out once the new product is launched, the development factor should directly base on the sold quantities of the existing product. If the forecaster rates the innovativeness of the new product as low, she should set the development factor according to historical growth. If the forecaster rates the innovativeness of the new product as high, she should add a boost factor to this growth rate.

The tool calculates the growth rates ( $x(t|t+1)$ ) based on these inserted values.

$$x(ly|ly+1) = \frac{q_{ly+1}^T}{q_{ly}^T} - 1, \quad (3)$$

$$\text{with } q_{ly+1}^T = \sum_{k=1}^n \delta_{ly+1_k} * q_{ly}^T \text{ and } q_{ly}^T = \sum_{k=1}^n q_{ly_k}^T \quad (4)$$

with  $t \in [2015, 2019]$  and  $n = \text{amount of reference products}$

The tool considers an additional growth for the fleet fraction of quantities based on historical fleet ( $\varphi_t^T$ ) share growth:

$$x(\varphi_{ly-1|ly}) = \frac{\varphi_{ly}^T}{\varphi_{ly-1}^T} - 1 \quad (5)$$

In case the forecaster does not assume the proposed fleet share growth to be accurate, she can manually insert her expert estimation, which will then instead be used for further calculations.

With the help of these growth rates, the perspective quantities for launch year and the three following years are calculated:

$$q_{ly+1}^{T1} = (q_{ly}^T - q_{ly}^L) * (1 + x(\varphi_{ly|ly+1})) + q_{ly}^L * (1 + x(ly|ly + 1)). \quad (6)$$

This series has the quantity estimate of 2016 as first result. In case the new product is launched in a later year, the series calculation starts with 2016 as dummy variables in order to secure the successive growth factors. Accordingly, the forecaster has to set the boost factor in the year of product launch. Thus, the formula series shown above includes the launch year total quantities from approach 1:  $q_{ly}^{T1}$ .

### B2.3.2.2 Top-Down Approach

The main idea of the top-down approach is to evaluate the customer potential and estimate the market penetration. Based on the potential (PT) of existing customers and the total market of the regarded country, future quantities are calculated.

This approach can also be used for the quantity estimation of completely new products without any related existing product or hierarchy group. The tool shows the amount of potential customers (CU) separated in size classes. In case the forecaster wishes to investigate an existing product or hierarchy group, she can again insert her preferences and the tool subsequently shows the served market (EC) of the reference products separated in size classes.

In order to calculate the potential of these customers, the forecaster has to insert her assumptions on the amounts of the new product a customer needs. In a first step the forecaster has to estimate the amount of teams (AT) of 4 persons a customer of each size class has. For example, a customer of size A (biggest) is assumed to have 30 teams of 4 persons ( $AT_A=30$ ), whereas a customer of size E (smallest) is assumed to have 1 team of 4 persons ( $AT_E=1$ ). In a second step the forecaster has to estimate the amount of products per team per year (TY) for each trade. For example, a customer from trade 1 needs 4 products per team and year ( $TY_1 = 4$ ), whereas a customer of trade 2 needs only 1.5 products per team and year ( $TY_2 = 1.5$ ), because in the branch of trade 2 the product is not as consequently needed as in trade 1. Since these assumptions highly differ for each product it is necessarily to be filled in manually.

The potentials for the customer universe and the existing customers are calculated as follows:

$$PT^{CU} = \sum_{i=1}^5 \sum_{j=1}^7 (TY_j * \vartheta_j^{CU}) * AT_i * CU_i, \quad (7)$$

with  $\vartheta_j^{CU}$  representing the trade distribution of the customers in the total market, s.t.

$$\sum_{j=1}^7 \vartheta_j^{CU} = 1 \quad (8)$$

In case no reference product or hierarchy group is entered, the forecaster may now enter her estimated penetration rate ( $\gamma^{CU}$ ) to the customer universe and thus gets the perspective quantities to be sold. In case a reference product or hierarchy group is entered, the historical penetration rates are calculated:

$$\gamma_t^{CU} = \sum_{i=1}^5 \frac{\sum_{k=1}^n q_{ki}^T}{CU_i} \quad (9)$$

$$\text{and } \gamma_t^{EC} = \sum_{i=1}^5 \frac{\sum_{k=1}^n q_{ki}^T}{EC_i}, \quad (10)$$

with  $t \in [2014, 2015]$ .

In order to estimate the penetration rate for the launch year, the growth rates are calculated:

$$x(\gamma_{t-1|t}^{CU}) = \frac{\gamma_t^{CU}}{\gamma_{t-1}^{CU}} - 1, \quad (11)$$

$$x(\gamma_{t-1|t}^{EC}) = \frac{\gamma_t^{EC}}{\gamma_{t-1}^{EC}} - 1. \quad (12)$$

With the help of these indicators the tool gives the quantity suggestion for the first year after product launch ( $q_{ly}^T$ ):

$$q_{ly}^{T2} = \gamma_t^{CU} * (1 + x(\gamma_{t-1|t}^{CU})) = \gamma_t^{EC} * (1 + x(\gamma_{t-1|t}^{EC})) \quad (13)$$

The quantity estimation is the same for both, total market and served market view. The changing parameter in the outcome of this approach is the market penetration rate. This rate is shown and calculated for both views in order to confront the forecaster with how much more can be gained in the market. Thus, if these rates are sufficiently low, the forecaster might keep it in mind and also consider it in the price setting part of the business case.

### B2.3.2.3 Bottom-Up Approach

In focus of this approach is the sales force. This approach can also be used in case there is no appropriate historical reference data. The tool gives the amounts of sales persons (SP) per trade for the investigated market for the years 2015 and 2016. The forecaster can thus see the increase in sales persons from one year to the other. She can now enter her estimates of the additional amounts of sales person (ASP) for launch year. In case there is no reference product or hierarchy group, she can also directly enter her estimate of how many entities of the new product one salesperson will sell per year. In case there is a reference group, the tool calculates how many entities of the reference group have been sold per sales person (qSP) in each trade in 2015.

$$qSP_{2015j} = \frac{\sum_{k=1}^n q_{2015k}^T}{SP_{2015j}}. \quad (14)$$

The forecaster can now decide whether the amount stays the same or changes for the upcoming product and either insert her divergent estimations or adopt the historical amounts. With the given and inserted values, the quantities for the launch year are calculated:

$$q_{ly}^{T3} = \sum_{j=1}^7 (SP_{tj} + ASP_j) * qSP_{(t+1)j}. \quad (15)$$

#### B2.3.2.4 Customer Cluster Approach

The last approach is constructed for new products that do not have a predecessor, but related products that may have the same customer group. The essence of this approach is to group customers based on their previous buying behavior in order to find the customers that will buy the new product. Therefore, the forecaster has to enter her reference products or hierarchy groups.

She can now select two conditions for each entered reference. One condition concerns the quantities a customer bought and the other concerns the net sales the company gained with a customer. For example, she can choose to get the amount of customers that bought more than 5 entities of one of the reference products and generated more than 100€ of net sales in 2015. The tool now filters the historical data and shows the respective amount of customers grouped into size classes. In case the customers are the same for the inserted reference products or hierarchy groups under the respective inserted conditions, they are subtracted from the overall amount of respective customers (AC). The forecaster now enters her estimated amount of quantities of the new product (qC) that one customer will buy in its launch year. With these values the tool calculates the expected quantities for launch year:

$$q_{ly}^{T4} = \sum_{i=1}^5 qC_i * AC. \quad (16)$$

#### B2.3.2.5 Summary of Values and Quantity Suggestion

In a separate section of the tool the quantity forecasts of the four approaches are summed up. Since comprehensive growth rates are considered in approach 1, it provides quantity values for all years from launch year to the fourth year after launch. The earliest possible launch for this calculation is July 2016. The remaining 3 approaches each deliver one quantity estimate for the launch year (12 months from launch). In order to deliver one quantity estimate for the launch year, all launch year quantity estimates are set on average. The forecaster has the opportunity to weight certain approaches more than others in the average.

$$q_{ly}^T = \frac{q_{ly}^{T1} + q_{ly}^{T2} + q_{ly}^{T3} + q_{ly}^{T4}}{4} \quad (17)$$

#### B2.3.3 Price Forecast

Since there are several sophisticated price forecasting tools already, this tool solely focuses on the predecessor – successor scenario and gives links to other tools for price alignment of entire completely new products.

The price forecast for each country is done in local currency. In the third part of the tool, case calculations, all prices are transferred to Euro, by using the actual exchange rate.

In the tool, the procedure of aligning a price is to set a discount price for the trade and potential class combination of the core customers of the new product. All other prices are calculated depending on this alignment.

The price forecast is divided into six parts:

- (i) Analysis of historical net sales and profit margin
- (ii) Analysis of historical pricing data
- (iii) Analysis of historical price engine
- (iv) Analysis of historical fleet pricing
- (v) Price alignment
- (vi) Time series

### B2.3.3.1 Analysis of Historical Data

The first part of the price forecast has the aim of giving a broad overview of how the predecessor performed. Therefore, the forecaster decides on a proper predecessor of the product she is about to launch. She can choose a single product or any existing hierarchy level.

Once the forecaster filled in the predecessor, the tool shows the total net sales of the past two full years and current year to date. Subsequently the development factor between the two years is calculated.

$$\delta_{NS_{t-1}|NS_{t-2}}^T = \frac{NS_{t-1}^T}{NS_{t-2}^T} - 1, \text{ for } NS_{t-2}^T \wedge NS_{t-1}^T > 0 \quad (18)$$

$$\delta_{NS_{t-1}|NS_{t-2}}^T = \left(\frac{NS_{t-1}^T}{NS_{t-2}^T} - 1\right)^{-1}, \text{ for } NS_{t-2}^T \vee NS_{t-1}^T < 0 \quad (19)$$

The difference between net sales generated through fleet sales and net sales generated through ordinary sales is highly important for the price alignment of a successor. Thus, the historical net sales and its development factor is also shown for fleet and ordinary sales separately.

$$\delta_{NS_{t-1}|NS_{t-2}}^F = \frac{NS_{t-1}^F}{NS_{t-2}^F} - 1, \text{ for } NS_{t-2}^F \wedge NS_{t-1}^F > 0 \quad (20)$$

$$\delta_{NS_{t-1}|NS_{t-2}}^F = \left(\frac{NS_{t-1}^F}{NS_{t-2}^F} - 1\right)^{-1}, \text{ for } NS_{t-2}^F \vee NS_{t-1}^F < 0 \quad (21)$$

$$\delta_{NS_{t-1}|NS_{t-2}}^L = \frac{NS_{t-1}^L}{NS_{t-2}^L} - 1, \text{ for } NS_{t-2}^L \wedge NS_{t-1}^L > 0 \quad (22)$$

$$\delta_{NS_{t-1}|NS_{t-2}}^L = \left(\frac{NS_{t-1}^L}{NS_{t-2}^L} - 1\right)^{-1}, \text{ for } NS_{t-2}^L \vee NS_{t-1}^L < 0 \quad (23)$$

In certain cases, the historical net sales can be negative. This is because the data warehouse also lists replacements and reparations. This is just an exceptional case, but has to be considered in order to provide reliable values.

The tool now shows the product costs of the predecessor (SPC) and its development factor. In general, the product costs shrink over time because of less expenses for trainings and long term contracts with the producers.

$$\delta_{SPC_{t-1}|SPC_{t-2}} = \frac{SPC_{t-1}}{SPC_{t-2}} - 1 \quad (24)$$

Subsequently historic profit (SPP) and profit margin (SPM) are calculated.

$$SPP_t = NS_t^T - SPC_t^T * q_t^T \quad (25)$$

$$SPM_t = \frac{SPP_t}{NS_t} \quad (26)$$

### B2.3.3.2 Analysis of Historical Pricing Data

In this part the focus is on the price alignment of the predecessor. The historic list price (LP) is shown at first. This is the price before discount and thus always above average prices. To help the forecaster analyzing whether the pricing of the predecessor was appropriate or not, the average prices (aNSP) are calculated over the whole customer group, for C-customers only and for E-customers only. This is helpful since C-customers are the biggest customer group and generate the greatest part of net sales at the observed company. Prices of C-customers usually are lowest. On the contrary, E-customers are the smallest customers and generate the smallest part of net sales in the observed company. Prices for E-customers are usually highest. Also the aNSP is calculated in total, for fleet only and for non-fleet sales only.

$$aNSP_t^{T(T)} = \frac{NS_t^{T(T)}}{q_t^{T(T)}} \quad (27)$$

$$aNSP_t^{T(C)} = \frac{NS_t^{T(C)}}{q_t^{T(C)}} \quad (28)$$

$$aNSP_t^{T(E)} = \frac{NS_t^{T(E)}}{q_t^{T(E)}} \quad (29)$$

### B2.3.3.3 Analysis of Historical Discount Price

The aim is to have 50% of the net sales generated through discount prices and 50% of the net sales generated through prices with additional discount by the salesforce. This aim can only be reached in case the discount price is set properly. Thus, it is important to evaluate how often discount pricing and additional discount pricing historically occurred. The forecaster thus knows whether the predecessor was priced well or not.

Therefore, the tool calculates these shares for all customers, C-customers and E-customers.

$$\eta_t^T = \frac{NS_t^{T(PE)}}{NS_t^{T(T)}} \quad (30)$$

$$\tau_t^T = \frac{NS_t^{T(Ag)}}{NS_t^{T(T)}} \quad (31)$$

These two pricing types can only occur in non-fleet sales. Thus, there is no need of distinguishing between fleet and non-fleet.

#### B2.3.3.4 Analysis of Historical Fleet Prices

The fleet prices are assumed to be a fraction of the list price in order to reach a proper profit estimate. Thus, the fleet price is set into relation to the list price. The forecaster can firstly observe the list prices again and then the average fleet prices. Subsequently the relation between list prices and average fleet prices is calculated by a fraction.

$$l_t^T = \frac{aNSP_t^{F(T)}}{LP_t} \quad (32)$$

#### B2.3.3.5 Price Alignment

In the previous four parts in the pricing chapter, the forecaster has the opportunity to observe the pricing of the predecessor. She understands how the pricing was set, whether it was accepted by the customers or not and how it influenced the company's development. The forecaster now has all information she needs to price the successor. In this part of the tool she first sets the non-fleet price and then the fleet price.

The forecaster is supposed to set the discount price for the core trade and core potential combination of the main customers. Therefore, the tool shows trade and potential class of the main customer group and the respective discount (d). In case the forecaster does not agree with this trade/potential class combination, she has the opportunity to change it. Subsequently the discount price for this customer group is shown. With this, the forecaster has another reference price for her price alignment. With the discount price share in mind, she now sets the discount price for the new product. In case the discount price share of the predecessor was significantly under 50%, she is supposed to set a lower price than the one of the predecessor. In case the price engine price was significantly above 50%, she is supposed to set a higher price than the predecessor price. This is important in order to maximize profit. The new discount price ( $PD_{ly}$ ) thus is an input variable and the new list price is calculated as follows:

$$LP_{ly} = \frac{PD_{ly}}{1-d} \quad (33)$$

For the reasons illustrated in section 4.4.2, it is important to also align the gap between average net sales price and discount price. Therefore, the historical gap (g) is calculated and presented in the tool. The forecaster can now change this gap according to her price alignment. In case the price engine price is set lower compared to predecessor, the gap gets smaller. In case the new price engine price is set above the predecessor's respective price, the gap gets bigger. Depending on the

discount price of core trade/potential and this gap the aNSPs for all customer and potential classes is calculated separately. This is important in order to find an appropriate profit estimate. As mentioned above, these prices are all non-fleet prices.

$$aNSP_{ly} = PD_{ly} * \eta_{ly} + \frac{PD_{ly}}{g_{ly}} * \tau_{ly} \quad (34)$$

The new fleet price (PF) is calculated on the basis of the new list price. The historical relation between fleet and list price (f) is taken and applied to the new fleet price. In case the forecaster does not agree with this fraction, she can change it.

$$PF_{ly} = LP_{ly} * f \quad (35)$$

### B2.3.3.6 Time Series

The business case must present profit estimates for at least three years. Growth rates are already considered in the quantity estimates. Thus, the pricing estimate only includes price developments. The observed company considers a list price increase (LPi) of about 2% a year. However, this is not viable in most of the cases. Thus, the forecaster has to estimate a pull-through rate ( $\zeta$ ). This rate represents the share of the 2% increase that will actually reach the customer (e.g., 0.5 of the list price increase will reach the customer, means the list price actually increases by 1%). With this pull-through rate, the tool calculates the price development for the next 3 years after launch year.

$$aNSP_{ly+1} = aNSP_{ly} * (1 + LPi * \zeta) \quad (36)$$

### B2.3.4 Case Calculations

Forecasted quantities and prices are now merged. Future net sales, profit and profit margin are calculated for launch year and three following years. This is done for each country separately and aggregated on central Europe level. As mentioned above, the prices for the countries Switzerland and Poland are here converted into Euro.

Prices and quantities forecasted in the previous parts of the tool are assumed to be the most probable in case no other changes occur. However, the forecaster has the opportunity to make changes in prices, quantities and/or growth rates and thus calculate two more cases, such as an aggressive case and a conservative case.

Future net sales are calculated in total and separately for fleet and non-fleet.

$$NS_{lt}^T = NS_{lt}^L + NS_{lt}^F \quad (37)$$

$$NS_{lt}^L = \sum_{j=1}^7 \sum_{i=1}^5 q_{litij}^L * aNSP_{litij}^L \quad (38)$$

$$NS_{lt}^F = q_{lt}^F * P_{lt}^F \quad (42)$$

For the following years after launch, we assume the growth rates to account for all trade and potential combinations. Thus, quantities and prices are merged one to one.

$$NS_{lt+1}^T = NS_{lt+1}^F + NS_{lt+1}^L \quad (39)$$

$$NS_{lt+1}^L = q_{ly+1}^L * aNSP_{ly+1} \quad (40)$$

$$NS_{lt+1}^F = q_{ly+1}^F * PF_{ly+1} \quad (41)$$

The profit and the profit margin are calculated according to formulas (1) and (2). The SPC is taken from the input data the central Europe product manager previously filled in.

Based on net sales the compound annual growth rate (CAGR) is calculated for each country separately and on central Europe level.

$$CAGR_{(ly|ly+3)}^{CE} = \left( \frac{NS_{ly+3}^{CE}}{NS_{ly}^{CE}} \right)^{1/3} - 1 \quad (42)$$

The forecaster now has three input fields. Firstly, she can set a percentage change in prices. Secondly she can set a percentage change in quantities and lastly she can set a new CAGR. Like that she has the opportunities to play with the numbers and go through different scenarios. For example, she raises the prices by 10%, lowers the quantities by 5% and halves the CAGR. She can observe how the profit develops under these circumstances. The tool offers space for two of such scenarios. This is what the product manager typically has to present in her business case presentation.