



LUND UNIVERSITY

## **Process thinking, Process living**

A case study of business process management and the set and use of performance indicators at a German manufacturing firm

BUSN79 Spring

*Business Administration Degree Project in Accounting and Finance*

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## Abstract

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Authors:	Adrian Schneiders and Philipp Veer
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Keywords:	Process orientation, Business process management, Performance measurement, Performance indicators, and Implementation challenges
Purpose:	The purpose of this study is to examine types of challenges during the implementation of BPM regarding the set and use of performance indicators from a theoretical and practical perspective. Consequently, this thesis generates an understanding by illuminating reasons behind the previously found challenges.
Methodology:	This case study has followed a qualitative, abductive research strategy. The used primary data is obtained through open and semi-structured interviews. Data collected through documents, reports and observation have been used as support and triangulation to the interview data.
Theoretical perspectives:	Following the abductive research strategy, a literature review of theoretical perspectives has been used to set the basis of this thesis. By this means, the focus lied on relevant theory concerning the implementation of business process management and performance measurement in combination with the set and use of performance indicators to explore <i>how</i> they are implemented and <i>why</i> it can be challenging. The theoretical perspectives used are: Business Process Management (BPM), Performance Measurement Systems (PMS), Key Performance Indicators (KPI) and Process Performance Indicators (PPI).
Empirical perspective:	The empirical perspective was derived from 11 interviews with 9 representatives from different management levels at our case Company X. Further insights were obtained through documents (internal and open access) concerning the introduction and development of the business process management.
Conclusions:	The findings of this thesis point out that during the implementation of BPM with regards to the set and use of performance indicators, company/ technical and people related challenges can be found in the literature, whereas company/ technical are outbalancing people related ones. However, the results showed that from the case company perspective, people related challenges have been experienced the most. Beyond, we highlight that challenges are interrelated and influence each other and that causes can be found in: alignment of processes and indicators, balance standardization and chaos, balance tension between strategic areas on company/ technical side. Moreover, on people side causes can be found in: leadership, communication and experience. Besides the answers to our research question, we emphasize that the literature is fragmented and too simplified.

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## **Index of Abbreviations**

BP	Business Process
BPE	Business Process Engineering
BPM	Business Process Management
BPO	Business Process Orientation
BSC	Balanced Scorecard
CFO	Chief Financial Officer
CPM	Corporate Performance Management
CPO	Chief Process Officer
HR	Human Relations
KPI	Key Performance Indicator
MCS	Management Control System
PI	Performance Indicator
PM	Performance Measurement
PMS	Performance Measurement Systems
PPI	Process Performance Indicator
PPMS	Process Performance System
TQM	Total Quality Management

# 1. Introduction

*The first chapter describes shortly the development of process orientation, entailing performance measurement, and challenges during this time. Thus, a basis for the problem specification is created. Consequently, the purpose and our research questions are presented followed by a reader's guideline.*

## 1.1 Process Orientation Development

In new ways than before, optimization from a personal but also from an organizational perspective dominates the world of today in which organizations face the increased demand of their customers who want their needs satisfied faster, cheaper and better (Smith, 2007; Harmon, 2014). To manage this increased demand, organizations have found ways to raise their efficiency and effectiveness (Smith, 2007; Škrinjar, Štemberger and Hernaus, 2007; Hellström and Eriksson, 2008). The most dominant factor for organizational performance is to manage process performance by transforming process strengths into competitive advantages. The aim is to ultimately reduce costs by identifying process weaknesses and possibilities to drive out these weak spots (Smith, 2007). The positive correlation between process performance or how an organization performs its business activities and achieves competitive advantages has already been examined by Porter (1996). Consequently, to be successful in today's business world, organizations should be prepared to focus on *“using their processes as a strategic weapon to deliver world-class performance”* (Smith, 2007:12). To do so, organizations are in need to adapt their management control mechanisms to effectively manage and foster process performance (Johnson, 2004). This new organizational focus on process performance requires a more flexible control system than before (Johnson, 2004). The view on how to focus on processes performance has evolved through four major stages in the last 20 years (Smith, 2007). We argue that it is important to comprehend how it has originated to understand the status quo of the process performance view.

The first process oriented view, namely Total-Quality-Management (TQM), gained worldwide popularity in the 1980s (Smith, 2007; Hellström et al., 2008). TQM is concerned about a *“set of systematic activities carried out by the entire organization to effectively and efficiently achieve company objectives so as to provide products and services with a level of quality that satisfies customers, at the appropriate time and price”* (Deming Prize Committee, 2014:2). According to this definition, organizations focused on continuous improvements, which entailed the analyses of processes in order to leverage weak spots in processes (Smith, 2007). Besides the positive impact for companies with this methodology, there was one major challenge. Over time this concept became popular. The business environment developed rapidly from technological innovations to the start of global customers. In fact, with TQM, organizations could not make significant improvements to



manage those changes since the methodology did not support rapid changes in the organizational structure and a holistic approach of process identification. As a consequence, organizations were looking for a more suitable tool to gain significant process improvements (Smith, 2007).

Hence, in this process a new methodology evolved in the early 1990s to manage the changes, that could not be managed with the old TQM methodology (Smith, 2007). This new methodology was called Business Process Engineering (BPE) and focused on the design of processes from the drawing table to the actual organization to ultimately achieve the best possible process (Hammer & Champy, 1993; Smith, 2007; Hellström et al. 2008). In this regard, BPE became quickly a commonly used methodology across management teams. Nevertheless, the problems with this methodology became obvious when organizations realized that even though processes had been reengineered, neither throughput times nor required personnel had been changed (Smith, 2007). Along with BPE, organizations realized that through a focus on processes, enormous benefits could be achieved but that reengineering might not be the perfect methodology to achieve those benefits. Mainly this realization process was the starting point for the third phase in the business process orientation development (Smith, 2007).

Consequently, instead of exclusively focusing on process re-engineering, most companies started to design the whole organization to be process oriented (Smith, 2007). Accordingly, organization structures were set to foster the focus on processes. In return, these processes could then be run at highest possible efficiency to achieve internal and external value maximization. Nevertheless, it was important that organizations kept ambidextrous between those new processes supporting organizational structures and functional benefits (Smith, 2007). Nonetheless, many companies failed to restructure their organization to foster process performance, while other had major difficulties to document the advantages of this reorganization. Regardless of the reason of failing, it also was mostly a question of costs (Smith, 2007). Even though the challenges were ever-present, the major impact of this phase was the change in mind of organizations. They realized that processes should be considered in all management decisions to be successful in the future. As a consequence, organizations started to engage in proactive planning on how they could influence process performance to maximize future success (Smith, 2007).

From this point, the fourth and latest phase evolved, namely “process based competition” (Smith, 2007). Within this phase, organizations heavily focus on the assessment and identification of their process strengths and weaknesses and then engage in extending the strengths while redesign the weaknesses. In addition, organizations started to include process performance in their overall corporate strategy (Smith, 2007). Furthermore, organizations focused on implementing performance measurement systems to maximize possibilities by increasing the effectiveness of their business

processes. Hereby, business processes or in other words measurable entities, evolved to be the core functions within the company, which is then primarily built on processes and not on services or products (Hellström et al., 2008; Glaven, 2011). Seeing the organization as a system of processes is one of the main reasons why some organizations nowadays rather focus on process performance than on product or functional methodologies (Škrinjar et al., 2007; Glaven, 2011). In other words, in our world today, competition is based on focusing and driving process performance to gain competitive advantages, enter new markets, engage to new customers etc. and consequently make profit (Smith, 2007; Škrinjar et al., 2007).

## 1.2 Performance Measurement and Process Orientation

Besides the change in perspectives, also the supporting management tools have evolved. Next to the development of process and functional perspectives within organizations, companies and researchers have created tools in order to manage, measure and evaluate performance. This assessment was necessary to enable the understanding of individuals and groups where the organization stands in comparison to the competition (Kueng, 2000) and to align organization's business operations with its strategy (Kaplan and Norton, 1992). The traditional approaches have been backwards-looking and purely financial so that some researchers and practitioners like Kaplan (1984) started to question this approach. He demanded a broader view of performance measures facing new trends and aspects such as flexibility, time, quality and customer satisfaction, which turned the Performance Measurement (PM) into a multidimensional discipline (Kaplan, 1984). With the introduction of the Balanced Scorecard (BSC) by Kaplan et al. (1992) non-financial as well as financial measures have been taken into consideration. This holistic view ensured the alignment of operations and performance with organization's strategy and integrated PM into a system that supports business. It aims to support the translation of strategy into operational indicators and objectives with targets (Van Looy and Shafagatova, 2016). Additionally, its purpose is to increase overall effectiveness and efficiency of the business processes.

However, researchers examined that businesses have been undergoing continuous business improvements and process reengineering (Kueng and Krahn, 1999; Han, Kang and Song, 2009) to attain sustainable competitive advantages and respond faster to the dynamic business environment (Han et al., 2009). The development of business reengineering and reorganization have led to the situation that functions of the organizations do not primarily consist of products or services, but rather of processes and their interactions (Glaven, 2011). That means that the functional organization is replaced by process-oriented systems (Kueng, 2000). With these "*chains of events, activities and decisions*" (Duma et al., 2013, cited in Van Looy et al., 2016:2), organizations and researchers are facing new requirements towards the PMS in order to still connect the areas of business process

performance and organizational performance (Van Looy et al., 2016). Kueng (2000) defines two main requirements: (1) the PMS should focus on processes, not on departments or units and (2) should evaluate the organization holistically. According to Glavan (2011), through a Process Performance Measurement System (PPMS), companies are able to respond even faster to dynamic markets by implementing a flexible structure. This structure can be seen as combination rather than a pure functional and product oriented perspective.

Generally, literature shows a distinction between models focusing on the entire business (Lynch and Cross, 1988; Kaplan et al., 1992), and models, which focus on single business processes (Kueng, 2000; Neely, Adams and Crowe., 2001). However, only a small number of researchers address PPMS, whereas many focus on suggesting steps and stages for the design and characteristics of PMS in such a context (Van Looy et al., 2016) by using BSC as a starting point to identify the holistic view and perspectives to define aspects and indicators. This could be exemplified by the introduction of the Process Performance Measurement Framework (PPMF) by Han and Kang (2007). In their article, the authors described the influence of operational level business process KPI's on specific KPI's in the strategic and tactical level. The KPI's in the strategic level are classified in the four perspectives of the BSC. Han et al. (2007) suggested that to accomplish goal congruence within the organization, performance measurement should not be managed separately from business processes. Process innovation and continuous improvement are in need for real-time measurement and analysis, so that companies stay competitive (Han et al., 2007; Han et al., 2009).

Consequently, an empirical study conducted by Leahy (2004) indicated that companies should adopt flexible performance measurement systems to change metric targets as forecasts and environment changes. We believe that PMS is necessary for business improvements and represents a prerequisite for process orientation, true to the motto: *“Measurements are key. If you cannot measure it, you cannot control it. If you cannot control it, you cannot manage it. If you cannot manage it, you cannot improve it”* (Harrington, 1991, cited in Kueng et al., 1999).

### 1.3 Research Problem Specification

Modern businesses are in need to constantly find new concepts and models for BPM that are supported by performance measurement to stay competitive, flexible and increase overall efficiency (Domanović, Jakšić and Mimović, 2014). So far, literature provides detailed conceptions of BPM and PMS. Yet, Nudurupati, Bititci, Kumar and Chan (2011) and Cleven, Winter and Wortmann (2012) identified difficulties for the BPM implementation on a holistic level, but do not connect specifically performance indicators and process orientation. Furthermore, literature mostly does not identify dependencies between performance indicators, performance management and the resulting approach

for process orientation. In this area, researchers lack to specify concrete roots to anticipate challenges during the implementation. The presented ideas lack dynamism, flexibility and adaptability so that organizations face different requirements and challenges in implementing performance indicators and frameworks that support the new business process orientation. To our best knowledge, there is no comprehensive framework, which identifies these challenges, categorizes them and further provides reasons to tackle those challenges. Moreover, the relevance of this topic intrigues us and has influenced our decision to contribute to this field from a theoretical perspective.

The desire of organizations to continuously improve business processes can lead to the change towards BPM. Based on the introduction of a new BPM system, the entire organization is in need to revise and redesign its performance management and especially has to adapt the set of performance indicators and their usage. One company, which is changing towards process orientation due to a new corporate strategy, is our case Company X<sup>1</sup>. With that been said, Company X is and has been facing challenges with the change towards process orientation in different areas, from challenges entailed to their new organizational structure to challenges within their management control and performance measurement system. One major area of challenges can be seen in the implementation and usage of performance indicators that support the new process orientation, the interrelation of them and alignment on strategic level. We argue that the case of Company X is one of many companies, that are on the move to the new era of process oriented organizations in order to meet the requirements of a modern world. In addition, Company X is currently in the phase of defining different process performance indicators for different processes. Associated with the definition, several challenges have and could occur in the future. This makes this case worth studying while it contributes to new knowledge from a practical perspective.

We are certain that there is a theoretical as well as practical need to understand challenges, their types and the reasons behind them that come along with the implementation of BPM regarding the set and use of performance indicators. Additionally, the way how a company implements BPM can be of interest to confirm previous empirical studies and provide guidance for other organizations.

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<sup>1</sup> The company name has been anonymized to protect the privacy of our case company.

#### 1.4 Purpose and Research Questions

The purpose of this study is to identify types of challenges through perusal of literature, including existing theories, previous empirical studies of challenges regarding the set and use of performance indicators that can occur during the implementation of BPM. Subsequently, experiences from the observed case company are presented to further include a practical view on the implementation and associated challenges. Finally, reasons why organizations face the observed challenges during the implementation of BPM are examined to create an understanding about causes and effects.

This study aims to provide answers to the three research questions below.

- 1) *What type of challenges can be found in existing theories and previous empirical studies concerning the implementation of business process management regarding the set and use of performance indicators?*
- 2) *How does an organization implement a business process management regarding types of challenges and management for the set and use of performance indicators?*
- 3) *Why do organizations face challenges during the implementation of business process management with regards to the set and use of performance indicators?*

## 1.5 Readers Guideline

### Chapter 1 - Introduction

*In chapter 1, relevant background information regarding process orientation and management control systems are provided, thus lead to the problem specification as well as the purpose and research questions of this study.*

### Chapter 2 - Methodology

*In chapter 2, our research strategy, design and methods are provided including the limitations of this study. In addition, the motivation behind this research is explained.*

### Chapter 3 - Theoretical framework

*In chapter 3, a literature review regarding applicable theories to business process management and performance measurement concerning implementation and type of challenges is provided.*

### Chapter 4 - Empirical findings

*In chapter 4, the empirical findings from the case company are described. Hereby, the focus lies on implementation and challenges of business process management with regards to the set and use of performance indicators.*

### Chapter 5 - Analysis and discussion

*In chapter 5, the empirical findings are analyzed for causes behind the experienced challenges which leads to a discussion about the results.*

### Chapter 6 - Conclusion

*In chapter 6, a summary of the main findings from the previous chapters is presented including theoretical as well as practical contributions.*

## 2. Methodology

*In the following chapter, the applied research strategy, design and used methods for this thesis are presented. The thesis follows a qualitative case study design, with an abductive approach. Hence, empirical data has been primarily collected through open and semi-structured interviews. Subsequently, a general discussion about validity, reliability and methodical limitations of this study are presented, whereas particle ones are discussed in chapter 6.*

### 2.1 Research Strategy and Case Study Design

In academic research, there are two dominant strategies for addressing the anticipated research topic, namely quantitative and qualitative research (Bryman and Bell, 2011). The first strategy, quantitative research is usually conducted through a deductive approach and is concerned about exploring theory, generating a hypothesis and testing it in practice to make quantifications. Contrary to quantitative, qualitative research is mostly conducted by following an inductive approach and is focusing on creating new theories by looking for connections between research and theory (Bryman et al., 2011). From the beginning of this thesis, we decided that our thesis should aim on investigating connections between research and theory and consequently the creation of new theoretical frameworks rather than testing a theoretical hypothesis to make quantifications. This decision can be related to our preferred working style of practical “hands-on” solution seeking rather than theoretical problem solving. Consequently, this thesis has been conducted using a qualitative research approach. However, while a common approach for qualitative research is inductive, most qualitative researchers include deductive components as well (Bryman et al., 2011). Therefore, we have consciously chosen to use a mix of deductive and inductive, called abductive approach, for this research. According to Ali and Birley (1999), through an abductive approach a prior theoretical model or construct can aid and enriches the research work. Furthermore, it has been described that a prior theoretical construct enables to discover additional effects or issues in the empirical data. We argue, that for the purpose of this thesis, the abductive approach is appropriate since it helps to guide and specify the investigation for implementation challenges. In addition, through this approach the interview questions can be on the one side more guided towards a specific direction to fit the purpose of this thesis and on the other side, a prior knowledge about implementation challenges can help to increase value during the collection of empirical data. These advantages have also been examined by Ali et al. (1999). Additional, Ali et al. (1999) points out that even though a prior model/construct is created, it does not exclude the adjustment or creation of a new model/construct to answer the research question. We suggest that this approach enlarges the flexibility while increasing the focus of this thesis.

Consequently, this thesis starts in a deductive way to create a prior model/construct according to the research purpose. This is then followed by the gathering of empirical data, where the created model/construct has been used as a guideline for the conducted interviews. Finally, the empirical data

as well as the theoretical model/construct have been combined and analyzed to first describe and explain the results and then to point towards possible research fields.

To collect and analyze empirical data as clear as possible, Bryman et al. (2011) provides a variety of different guidance frameworks to do so. From this variety<sup>2</sup>, we have chosen to conduct a case study research for this thesis. A case study mainly aims to answer the questions “How” and “Why” during the research (Yin, 2014). Moreover, according to Yin (2014) the case study is appropriate when on the one side, a control to manipulate the behavior of the participants is not necessary since the behavior cannot be manipulated and on the other side, that the focus of the research shifts towards contemporary, meaning historical events. Consequently, through a case study a “*detailed and intensive analysis of a single case*” is possible. (Bryman et al., 2011:67).

This thesis has been conducted as a single case study with the case company X. The choice to use Company X as our case company has been influenced by a previously conducted case assignment with them. Through this case assignment, our interest raised to work with Company X in order to benefit from the accessibility to the company and the interesting research topics regarding the change to BPM. Hereby, to our best knowledge, we have not found any studies concerning specific implementation challenges for the set of performance indicators regarding the change to BPM in relation to Company X or other companies. With that been said, we believe that the case of Company X can be a valuable learning opportunity for scholars as well as practitioners. Nonetheless, Yin (2014) provides a set of circumstances to when the use of a single case study is appropriate, whereas some can be found in the case of Company X. This set of circumstances consists among other factors, that the case should be critical and unusual. Thus, critical means that this case study “*can represent a significant contribution to knowledge and theory building by confirming, challenging or extending the theory*” (Yin, 2014:51). We argue, that the case of Company X is critical, due to the change to a BPM system and the concomitant challenges for their performance measurement system. Hence, implementation challenges for BPM have been widely explained in previous empirical studies. Yet, the concrete links to the set and use of indicators are lacking. As consequence, the case Company X can contribute to the theory and provides guidance to extending it. The second circumstance according to Yin (2014) is that the case should be unique in its nature. However, it can serve as basis for a larger number of organizations to for instance create awareness (Yin, 2014). We believe that the case study of Company X fulfils this circumstance, since the shift towards a BPM system for Company X is unique. Therefore, also the experienced implementation challenges are unique. Moreover, these experienced challenges can create the basis for other organizations who are planning to implement a BPM system, entailing the change in their performance measurement system. This

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<sup>2</sup> Bryman et al., (2011) describes five main research design approaches namely: cross-sectional design, experimental design, case study design, longitudinal design, comparative design.



thesis aims to understand specific implementation challenges of Company X and find causes of those. As a result, we believe that a single case study design has been appropriate for this study with Company X.

## 2.2 Research Method

### 2.2.1 Research Approach for Relevant Theoretical Perspectives

The first step in the creation phase of this thesis has been the collection of relevant theoretical frameworks and empirical data. Hereby, we started our research with a general search for literature concerning business process and performance measurement, while we have mainly looked for recently published literature reviews that provide us with a holistic view in this topic. Consequently, a literature review from Van Looy et al. (2016) served us as a starting point for further research. This technique can be referred to snowballing, a technique that is described as the development of sources coming from one base (Bryman et al., 2011). Through cross-referencing in the Scopus and Researchgate database we found other articles and books, which have been used in this literature review and were applicable to the purpose of this thesis. Simultaneously, we used LUBsearch and the EBSCO Host database to find theoretical frameworks. In order to find relevant literature, we used key-words such as “business process management”, “process performance measurement” or combinations of words like “process management” with “indicators”, “performance measurement” and “process orientation.” All in all, we found a huge variety of different, more or less, relevant articles, books and eBooks. Thus, we screened or read them and developed a method to (1) sort them according the importance to the case, (2) highlight the important parts, (3) indicate the main topic as well as the one who screened or read the article or eBook in the file name. Hereby, we have determined the importance to the case according to the title of the article or book, the date of publish and the frequency of our defined key-words mentioned in the article or eBook. Consequently, this led to that we could clarify the most relevant articles, books or eBooks. Moreover, we believe that this thorough method helped us to develop a solid theoretical background and perspective for this thesis. The next step in the process of this thesis has been the collection of empirical data.

### 2.2.2 Gathering Empirical Data

There are many sources of empirical data to be considered while conducting a case study. Therefore, Yin (2014) listed six main sources of empirical data, which are the most important to consider. On the left side of Table 1 below, these main sources are presented. In addition, Yin (2014:105) argues that “*a good case study [...] want to rely on as many sources as possible.*” Consequently, on the right side of Table 1, we have matched and listed our case sources. Hereby, the details of the interviews and a

distinction between data from interviews and data from documents will be explained in detail later in this chapter.

*Table 1 - Main Six Sources of Evidence*

<b>Yin (2014) Main Six Sources of Evidence</b>	<b>Company X Case Sources of Evidence</b>
Documentation	During the case study with Company X, we used several press releases, reports and internal material from Company X
Archival records	During the case study with Company X, we had access to: <ul style="list-style-type: none"> <li>- Several records from Company X</li> <li>- Case assignment files from 2016</li> </ul>
Interviews	During the case study with Company X, we conducted two types of interviews in person or by phone <ul style="list-style-type: none"> <li>- Open interviews</li> <li>- Semi-structured interviews</li> </ul>
Direct Observations	During the case study, we had the possibility to observe: <ul style="list-style-type: none"> <li>- The manufacturing process from goods receipt to good out in including the observation of measurement during the process (Duration: 1h)</li> <li>- Live presentation of current project management lists, tasks and tools and measures (Duration: 0,25h)</li> </ul>
Participant Observations	N/A
Physical artifacts	N/A

*Source: Yin (2014) Case study research: design and methods*

As stated in Table 1, out of six, four different sources of evidence have been used. The essence of participatory observations is to take an active role within the researched environment instead of passive observing (Yin, 2014). We argue that participatory observations have not been possible since initial decision of the implementation of a BPM system at Company X has been conducted before this study. In addition, the research has been limited in specific knowledge about the business Company X and in time, thus made participant observations not applicable. In addition, during the time of this thesis, physical artifacts have not been accessible. Physical artifacts are described as for example “a

*technological device, a tool or instrument, [...] or some other physical evidence*” (Yin, 2014:117). Consequently, due to the research purpose, we believe that physical artifacts are not applicable. Nonetheless, we also believe that access to physical artifacts, if even practicable, would have not significantly enriched this thesis. This is supported by the argument by Yin (2014:117), who stated that *“physical artifacts have less potential relevance in the most typical kind of case study.”*

### 2.2.3 Interview Data Collection and Question Development

The collection of interview data has been done entirely through interviews with different managers in the hierarchy of Company X. We focused on one set of questions for all interviewees by this means it enabled us to easily compare and analyze the responses. We believe that through conducting interviews, the depth of understanding can be increased while interviewing different managers from different hierarchy levels helps to develop a larger picture and understanding of the challenges. Because of the chosen research strategy, the interview questions had to be formulated in such a way that through the responses, the purpose questions concerning “How” and “Why” could be answered (Yin, 2014). By this means, we initially focused on an open interview approach with questions (1) concerning the implementation of the BPM, (2) the challenges they faced during this time and challenges that are still present including their solution strategy and finally (3) about the reasons why they think they faced these challenges. These questions have been developed according to our research purpose, however with a broader scope and no prior theoretical framework. Subsequently, we asked these questions to one top level decision maker at Company X, the Head of Executive Department of BPM, who has a high level of knowledge regarding these topics. We argue that through this initial open interview style approach, we achieved to get a broad picture of the challenges and the process of the change to a BPM system from the initiators of this concept at Company X.

In addition to the open interviews, we also conducted semi-structured interviews with all participants. Therefore, we prepared a set of more detailed questions before conducting the interview. We used the reviewed theoretical perspectives (presented in chapter 3) as guidance model for the interview questions. The developed interview questions can be found in Appendix 1. Since some expressions could have led to confusions or have been too abstract, we developed examples to support those questions. Associated with this, we have been sending the list of interview questions to the participants two days before the interview to help them prepare to answer the questions in a more precise way. In this regard, we also described shortly in what way the participants take part in this thesis and the main purpose of it. During the interview, we sometimes skipped or changed the order of questions since some participants answered two questions in one or the answer led to another question in the sequence. In addition, we have asked frequently follow-up questions to clarify the answer

provided. According to Bryman et al. (2011) these characteristics correspond with perception of semi-structured interviews.

#### 2.2.4 Sampling of Interviewees

Equally important to the source for the collection of empirical data is the selection of appropriate samples fitting the case study's purpose (Bryman et al., 2011). Therefore, we have been using the concept of purposive sampling and more in detail snowball sampling. Purposive sampling is a form of sampling, which is concerned to acquire samples on a strategic way to fit the research question instead of sampling on a random base (Bryman et al., 2011). Furthermore, the samples should be chosen according to their relevance for the research purpose, but, however, should be diversified in perspectives and background. Consequently, to get relevant samples, the sample criteria needed to be defined (Bryman et al., 2011). Accordingly, we have chosen sample criteria to get the right participants for our research questions. We argue that the main keywords of our thesis are: BPM, PMS, KPI and PPI in combination with challenges and solution. Consequently, our samples have a strategic, human resources, finance and controlling background. These departments have been chosen since they fit to our criteria and lastly to the research questions.

After choosing our sampling criteria, we had to find samples at Company X. Therefore, we used the approach of snowball sampling. This approach is characterized as that the initial contact focuses on a small number of interviewees and from there, with the help of the initial contacted person or group, find other relevant interviewees (Bryman et al., 2011). Since we worked with Company X in a project before, we already were in contact with the Head of Executive Department of BPM, who worked in the Company X for around 5 - 10 years. He has been our first contact, interviewee as well as our responsible advisor from Company X, who helped us to get contact with other interviewees, enabled us to access internal documents and other material. According to Yin (2014), interviewees who are more actively contributing to the research can be seen as key informants. The benefit of a key informant is that their contribution can help the success of a case study (Yin, 2014). Thus, active contribution of the Head of Executive Department of BPM makes him a key informant of this thesis. With the help of him, we established contacts with other interviewees, who have fit to the earlier defined criteria. In the end, we conducted 11 interviews with participants from five different departments. Table 2 displays the interviewee's function as well as years at Company X, the interview type, the dates of the interview and the duration<sup>3</sup>.

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<sup>3</sup> All years, names and specific titles have been anonymized to protect the privacy of our case company.

Table 2 - Interviewees including Interview Details

Function at Company X	Years in Company	Interview Type	Date(s)	Duration
Head of Executive Department of BPM	5 - 10 Years	Semi-structured	22.11.16	1 h
		open interview	11.04.17	0,5 h
		open interview	04.05.17	0,5 h
Head of Strategy and Organization of Company X Holding Group	5 - 10 Years	Semi-structured	05.05.17	0,5 h
CFO	> 10 Years	Semi-structured	05.05.17	1,1 h
Executive Department of BPM - Business Development Manager	< 1 Years	Semi-structured	04.05.17	0,75 h
Executive Department of BPM - Construction Manager	5 - 10 Years	Semi-structured	04.05.17	1 h
Head of Human Relations	1 - 5 Years	Semi-structured	04.05.17	1 h
Executive Department of BPM - Manager Controlling and Strategy	1 - 5 Years	Semi-structured	04.05.17	1 h
Executive Department of BPM - Manager Sales Controlling and Strategy	1 - 5 Years	Semi-structured	04.05.17	1 h
Process Owner Quality Planning, Control and Management	5 - 10 Years	Semi-structured	04.05.17	1 h
				Total: 9.35 h

Besides the data generated through the interviews mentioned above, we had also the chance to get data from direct observations at Company X's headquarters in Germany. During the time in Germany, we visited and observed the manufacturing process from goods in to goods out. This observation was guided by one manager of the manufacturing team, who explained the single process steps within the main process as well as the measures and possibilities to measure. In addition, we had one live presentation about the current project management lists, tasks, tools and measures from one Business Development Manager, who is working in the Executive Department of BPM.

### 2.2.5 Document Data Collection

Generally, we have used the documents as support and verification for the collected data through the interviews. This method is called triangulation and strengthens the reliability of the empirical data and consequently of the thesis (Bryman et al., 2011). The document data of this thesis has been collected through mainly downloads from Company X's webpage or were given to us from our key informant. Accordingly, the webpage of Company X offered us the possibility to get access to press releases regarding the change and set of the new strategic direction and the corporate image report. Furthermore, we supplemented the disposable documents by acquiring the consolidated financial statements from the German Federal Gazette. In addition, through the close cooperation with our key informant at Company X, we had access to internal presentations and several archival records concerning the change to BPM. Another part and the starting point of this thesis has been a non-published case assignment regarding the development of a PMS with Company X conducted by us in late 2016. In fact, we have used data from this case assignment as additional source for this thesis. Consequently, the described documentation data represents three out of the four used sources of evidence mentioned in section 2.2.2.

### 2.2.6 Data Analysis Technique and Interview Process

Followed by identifying the empirical data from the several sources, the next step is to analyze the present data. Therefore, Yin (2014) proposes five analytic techniques to generate compelling empirical based findings. These analytic techniques range from pattern matching over time-series analysis to cross-case synthesis. Whereby pattern matching is according to Yin (2014:143) "*one of the most desirable technique*" when conducting a case study analysis. The principal behind pattern matching is to compare the empirical findings with a theoretical framework in order to identify patterns. The primary source for empirical data of this thesis are interviews, which have been partly recorded and later transcript. Therefore, we asked every participant, if he or she agreed to the recording of the interview before. In addition, we ensured every interviewee that their responses will only be accessible to the researchers and that their identity will be protected. Besides the possible recordings, we also took notes of the responses during the interview. These two methods allowed us to compare our note to the transcript and therefore, occurring uncertainties about the response regarding for instance implementation challenges of specific performance indicators, could have been clarified without conducting a seconded interview. We argue that through the combination of notes and transcripts the overall quality of the interview data has been enhanced. Nevertheless, we experienced that this method has been time consuming and might not be suitable for studies with a great amount of interview data. Lastly, we matched the combined data from notes and transcripts with the described theoretical perspectives to identify patterns within the data. As a result, we have found patterns during the matching phase, which, according to Yin (2014:143), "*help a case study to*

*strengthen its internal validity.*” These patterns have been conspicuous as for instance that the identified challenges from the theoretical framework also appeared in the several responses from different interviewees.<sup>4</sup>

### 2.2.7 Principles of Data Collection

During the data collection of interview and document data, we have followed several principles. The used principles have been taken from Yin (2014), who states that through the consistent application of the principles of data collection in combination with the six sources of evidence, the construct validity and reliability can be strengthened. The four principles consist of: (1) usage of multiple sources of evidence, (2) creation of a case study database, (3) maintaining a chain of evidence during the case and (4) question data from electronic sources (Yin, 2014).

The first principle states that through the usage of multiple sources, meaning more than two, the findings as well as the conclusion of the case study are *“likely to be more convincing and accurate”* (Yin, 2014:120). We argue that we have worked according to this principle, since we have used four out of the six sources of evidence mentioned in 2.2.2. Following, the second principle is to establish a case study database concerning mainly the case study data organization as well as documentation (Yin, 2014). As explained before, during the interview we took notes of the responses next to recording. In the rework process, we transcribed the recordings and matched them with our notes to increase the value of data. Furthermore, we developed a data storage technique, including name and title of participant, interview data, time and place of our interview data, which helped us to organize our data to ensure easy accessibility. Consequently, we claim that our technique of organizing and documenting has been carried out according to this second principle. The third principle discusses the link between the case study questions and the case study report. Hereby, third parties should be able to trace the questions to the report as well as from the report to the questions (Yin, 2014). We point out, through the initial development of theoretical model/construct, the case study questions have been more focused and precise in order to create the case study report. Moreover, we support the chain of evidence by providing all sources to the used empirical data and explaining the circumstances that we think have influenced the study. The last principle is the careful reflection of electronic sources (Yin, 2014). Through the usage of data only from trustworthy sides like Company X’s webpage as well as the German Federal Gazette, we handled in line with this principle. As mentioned above, by working according to these principles, we have strengthened our thesis in terms of construct validity and reliability.

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<sup>4</sup> Empirical data and patterns are available on request.

### 2.3 Validity and Reliability

In order to ensure a high level of quality in research papers, Bryman et al. (2011) present three evaluation criteria to assess the paper accordingly. The criteria deal with the reliability, replication and validity of quantitative research. According to Bryman et al. (2011) reliability and validity could also be used for the assessment of qualitative research papers, however the meaning of these words need to be changed. Designed for the assessment of qualitative case studies, Yin (2014) presents the following change for these criteria. He suggested to consider reliability and further divide validity into construct, internal and external validity. These criteria have been expanded by Trochim (2006) and Bryman et al. (2011), who developed them as: transferability, comparable to external validity; dependability, comparable to reliability; confirmability, comparable to objectivity/construct validity and credibility, comparable to internal validity. Consequently, the quality assessment of this thesis has been conducted according to the meaning of transferability, dependability, confirmability and credibility to ensure assessment alignment to qualitative as well as case studies.

Transferability is described as if the results of the qualitative study can be generalized or applied to other milieus (Trochim, 2006; Bryman et al., 2011; Yin, 2014). We emphasize, that the transferability of results to general circumstances might be difficult due to the uniqueness of the company. Yet, Yin (2014) argues that posing the questions “How” and “Why” fosters generalization of the findings. As a consequence, the research questions of this thesis have a significant influence on the credibility of this thesis (Yin, 2014). Nevertheless, we believe that the findings as well as the resulting conclusions could be to some degree transferred to other organizations changing to a business process management system. Therefore, in chapter 6 practical as well as theoretical implications are presented.

Dependability has been described as, by following the same steps of a research, other researchers should find the same findings and then be able to draw the same conclusions. This requires the initial researchers to document all steps of the creation process (Bryman et al., 2011; Yin, 2014). During the creation of this thesis, we have documented our research approach to provide other researchers the possibility to follow our approach in order to reproduce the same thesis with the same results. Nonetheless, we believe that even with a step by step analysis the results and findings will change in the end due to different external and internal circumstances during the time of the initial study development. This problem has also been investigated by Trochim (2006:1), who states that “*..by definition if we are measuring twice, we are measuring two different things.*” As a consequence, Trochim (2006) proposes to describe circumstances that have affected the research instead documenting the creation process. During the case study with Company X, we faced several circumstances, which, we believe, affected this study. The first one is the merger from Company X



and therefore the change in their strategic mindset. This strategic mindset change led to the implementation of a BPM system and the adjustments to their PMS. We argue that this circumstance adds to the uniqueness of this company and thereupon also the increase of dependability. In fact, we believe that the timing of this study, in terms of Company Xs progress in the development of their BPM, adds to the dependability of this study. Furthermore, as old traditional family business, Company X fostered and promoted different values not aligned with process performance in the past. Through the new strategic direction, we believe that the progress of change in the mindset of the interviewed employees, influenced the dependability. Lastly, we believe that the educational background has been influential to our decision and choice of the theoretical framework in this thesis adding to the dependability of this thesis.

Confirmability is dealing with the extent of subjective judgments and values the researchers have affected the interpretation of the theoretical and empirical data so that the results and findings are highly influenced (Trochim, 2006; Bryman et al., 2011, Yin, 2014). Hereby, to achieve and strengthen confirmability, Yin (2014:47) suggested to use different sources, develop a chain of evidence and review empirical data by the key informant. We argue that, by using different sources regarding the applied theoretical perspectives, development of solid argumentation with several reasons of our perceptions and arguments as well as the reconciliation of the empirical data with our key informant, we have strengthened our confirmability. As mentioned above, through the application of Yin's (2014) three principles of data collection, the confirmability is further supported. However, a fully uninfluenced research cannot be conducted in qualitative research studies (Bryman et al., 2011).

Lastly, credibility describes how believable or plausible the results of a study are (Trochim, 2006; Bryman et al., 2011). In order to achieve a high degree of credibility, Yin (2014) suggests to use one of the above described analytic techniques for empirical data. Through the application of pattern matching to analyze the given empirical data of Company X, the level of credibility can be considered as high.

## 2.4 Limitations

During the creation of this thesis, we identified several limitations concerning the research strategy as well as limitations associated with other factors. The first group of limitations origins in the research strategy. Bryman et al. (2011) proposes some critique points to a qualitative research strategy. As we have chosen to conduct a qualitative research, we are certain that these points are highly relevant for our thesis and therefore can be seen as limitations to this thesis.

Bryman et al. (2011:413) argues that the findings of a qualitative research “*rely too much on the researcher's often unsystematic views about what is significant and important*”, which makes the study too subjective. Correspondingly, through the open and semi-structured interviews our view as well as the information provided by the participants could have been distorted. We believe that even though we started with a theoretical model/construct as guidance for the interviews to constrain subjectivity, it still can be seen as limitation. Furthermore, through the relationship of Mr. Veer to Company X, our perception as well as the responses to interview questions could have been biased strengthening the limitation of subjectivity. Associated with subjectivity, is the critique that qualitative studies are hard to replicate (Bryman et al., 2011). Due to, as described, influential circumstances and subjectivity during the creation of this case study, we see this point as a limitation to our thesis. Another critique is the limit to draw generalized conclusions from a qualitative case study (Bryman et al., 2011; Yin, 2014). We acknowledge this limitation if the aim of this study was to draw generalized practical conclusions. As explained earlier, due to the uniqueness of this case it is hard to do so. However, the aim is to expand, develop and point towards possible theoretical implications. Bryman et al. (2011:414) states that “*the findings of qualitative research are to generalize to theory rather than to populations*”, which qualifies this limitation.

Besides the points mentioned by Bryman et al. (2011), we propose other limitations to this thesis. First of all, most of the conducted interviews were held in German with the consequence that the interview questions had to be translated from English to German and the responses from German to English. During the two language translations, meanings, wordings and tone could have been changed slightly or could have gotten lost. Together with the fact that interviews have been the primary source of data, we see here a significant limitation to the results of this thesis. In addition, during the creation of this thesis, we faced a high variety of similar shortcuts with different definitions. For example, we encountered PM as on the one side defined as performance measurement and on the other side process management. This sometimes led to confusion within the interviews as well as the literature review and could be an influential factor in limiting the findings. Furthermore, the applied snowballing technique as well as usage of keywords in our research procedure for theoretical perspectives could have restricted the number of literature covered due to the connection to the initial paper or to a small number of accurate keywords. Lastly, we argue that through the help of our key informant and the applied snowball sampling, only like-minded interviewees could have been selected. Thus, it would have limited the richness of perspectives from the responses provided.

### 3. Theoretical Perspectives

*In the following chapter, relevant theoretical concepts, including BPM and PMS are presented. Hereby, the structure of the presentation is coming from the general concept of BPM over PMS to performance indicators. The chapter closes with a summary the key findings in which the types of challenges are presented.*

#### 3.1 Business Process Management

The modern organization is suggested, as described earlier, to change its orientation in order to meet the rapid changing requirements of their customers and markets to finally stay competitive (Neubauer, 2009; Nadarajah and Kadir, 2014; Sanchez-Ruiz and Blanco, 2016). Hence, recent empirical studies by for instance Neubauer (2009), Silva, Damian and Pádua (2012) and BPM&O and BearingPoint (2015) have shown that the traditional functional view of an organization cannot meet the requirements of this rapid changing conditions. These conditions can be seen in for example a global network of supply and demand, largely increasing global competitors etc. (Silva et al., 2012). Consequently, organizations shift their orientation from a functional structure to a process oriented structure in order to meet the new requirements and profit from the associated benefits (Silva et al., 2012; Sanchez-Ruiz et al, 2016). Associated benefits with process orientation can be seen for instance in better decision making, flexible structures for people management and process management, to name a few according to Nadarajah et al. (2014). The study of BPM&O et al. (2015) pointed out that companies want to achieve a higher transparency, cost reduction, process harmonization, quality improvements and higher customer satisfaction with an organizational process orientation. Generally speaking, we argue that companies are aware of the benefits entailed in this new perspective. This awareness of the benefits of process orientation can be traced back to the development of this view and the new requirements highlighted in chapter 1. For this purpose, a common methodology is BPM, since it should enable the organization to rapidly adapt to changes in the markets and to the needs of their customers (Neubauer, 2009; Hernaus, Bach and Vuksic, 2012; Nadarajah et al., 2014). Hereby, a study conducted in Germany, Switzerland and Austria by BPM&O et al. (2015) displayed that almost 75% of the 278 participants from different branches stated that BPM is one of the most important topics for them. We emphasize that this highlights the importance of this concept. Nevertheless, to understand the methodology of business process management, a common ground of the essence of business processes is needed.

Business processes have been widely described in academic literature as well as from practitioners in the last 30 years. One influential definition within this time was formulated by Davenport in 1992, where he defined business processes as: “*a structured, measured set of activities designed to produce*

*a specified output for a particular customer or market [...] A process is thus a specific ordering of work activities across time and place, with a beginning, an end, and clearly identified inputs and outputs: a structure for action”* (Davenport, 1992, cited in Burattin, 2013:27). Another influential definition was presented by Hammer and Champy in 1993, which focused more on the satisfaction of the customers. They stated that a business processes are: *“a collection of activities that takes one or more kinds of input and creates an output that is of value to the customer. A business process has a goal and is affected by events occurring in the external world or in other processes”* (Hammer and Champy, 1993, cited in Burattin, 2013:27). Furthermore, a broader definition was given by Garvin in 1998, who defined business processes as *“collections of tasks and activities that together — and only together — transform inputs into outputs. Within organizations, these inputs and outputs can be as varied as materials, information, and people”* (Garvin, 1998:33). It can be noted that all three definitions entail (1) a set of actions and tasks that (2) have a specific input and output to (3) create value for the customer. Corresponding to Davenport’s and Hammer and Champy’s definition, a more modern definition was adopted from Weske (2012:5), who defined business processes as *“a set of activities that are performed in coordination in an organizational and technical environment. These activities jointly realize a business goal. Each business process is enacted by a single organization, but it may interact with business processes performed by other organizations.”* We argue that this definition is broader than the initial definitions by Davenport (1992) Hammer and Champy (1993) and Garvin (1998). However, it still includes the three key components identified above. Consequently, this thesis takes the definition of Weske (2012) as basis for the business process management methodology.

Subsequently, business process management can be seen as a methodology *“supporting business processes using methods, techniques, and software to design, enact, control, and analyze operational processes involving humans, organizations, applications, documents and other sources of information”* (van der Aalst et al., 2003, cited in Neubauer, 2009:167). This definition corresponds to the definition provided by Weske (2012), who states that *“BPM includes concepts, methods, and techniques to support the design, administration, configuration, enactment, and analysis of business processes”* (Weske, 2012:5). It is claimed that through the BPM methodology, organizations can drive out business process weaknesses and foster process management and improvements while connecting them to their planned operational, tactical and strategical goals (Damij and Damij, 2014; Nadarajah et al., 2014). Accordingly, to achieve process improvements and alignment with organizational goals, BPM entails several key elements to be considered. These elements can be described as (1) the documentation of processes, (2) the horizontal instead of former vertical linkages across organizational structures, (3) the set of controlling activities to ensure consistency, (4) the implementation and execution of performance measurement, (5) the set of activities to continuously drive improvements and (6) the preparation and execution of a cultural change (Neubauer, 2009;

Nadarajah et al., 2014). Neubauer (2009) stresses that these elements combined grant the organization the ability to foster value creation with the corresponding business processes while continuously develop and improve the corporate strategy. In other words, it provides organizations with the flexibility to meet the rapidly changing requirements of the customers and markets (Sanchez-Ruiz et al., 2016).

However, a successful and sustainable implementation of the BPM methodology in organizations can be challenging (Neubauer, 2009). According to Silva et al. (2012) there are two main factors that can be seen as challenge to a successful BPM implementation, namely company related and people related ones. It should be stressed that these factors can be interrelated. From the company perspective, one major issue is that BPM and more specific business processes have to be aligned with the firm's long-term strategy (Neubauer, 2009; Hernaus et al., 2012; Silva et al., 2012). An empirical study from Neubauer (2009) identified this issue also as the major shortcoming in the examined organizations. Moreover, from a people's perspective, Neubauer (2009) and Silva et al. (2012) identified that the most influential factor is the involvement and know-how of management personnel for the analysis, design, implementation and optimization of the BPM methodology and especially the business processes. Nonetheless, according to Neubauer (2009) the main issue lies in the integration of BPM into the corporate strategy, which is a critical success factor. This issue can be seen as a result of irresolute management or a lack of performance indicators (Neubauer, 2009). This leads to the conclusion that the set and use of performance indicators or knowledge and learning of management personnel are key success factors for a successful BPM implementation. This thesis takes the lack of performance indicators as most influential factor regarding a successful BPM implementation into consideration. However, we argue that the knowledge and learning perspective is regardless of our choice, also of high importance and could be subject for further studies.

In order to explain the correlation between BPM implementation and performance indicators, we have to take step back to the six elements of BPM again (Neubauer, 2009; Nadarajah et al., 2014). According to Nadarajah et al. (2014) these elements can be summarized into a dynamic set of process management as well as continuous process improvement. Thus, continuous process improvements can be achieved through documentation, measurement and reporting of process performance (Silva et al., 2012; Nadarajah et al., 2014). Consequently, through a careful and thought through design of performance measures and their system regarding business process management, organizations are more likely to achieve process efficiency and strategy alignment (Bosilj-Vuksic, Milanovic, Skrinjar and Indihar-Stemberger, 2008; Silva et al., 2012). Nevertheless, these measures and the system should be implemented and then monitored while deviations have to be investigated and measures, if needed, adjusted. (Weske, 2012). Hereby, the question arises about the responsibilities and also the accountabilities concerning the design and implementation of process measures and continuous

improvements. In a break from traditional functional departments, special process owners/ managers as well as a CPO should be assigned (Elzinga, Horak, Lee and Bruner, 1995; Kohlbacher and Gruenwald, 2011; Damij et al., 2014; Nadarajah et al., 2014; BPM&O et al., 2015). According to Kohlbacher et al. (2011) the biggest visible difference between a process oriented organization and one relying on the traditional functional approach, is the appearance of process owners. Associated with process owners, the tasks comprise but are not limited to the management of specific business processes and the continuous improvements of them (Elzinga et al., 1995; Kohlbacher et al., 2011). In addition, process owners should connect and foster collaboration in between the functional areas within the company, which are involved in a specific process to work as one unit (Damij et al., 2014). Accordingly, individual actions of employees can be seen as a part of a chain of events going beyond traditional functional borders (Hellström et al., 2008). Nevertheless, this chain of events, or in other words this process, entails according to the definition of business processes, one clear beginning and end (Garvin, 1998). Hereby, the type of processes can be categorized as core processes that are directly linked to external stakeholder satisfaction, supportive processes that are connected to satisfy internal stakeholders and management processes, which are managing the other two types (Ould, 1995, cited in Damij et al., 2014). Yet, within the process, employees still belong to their functional area with their functional line manager. Consequently, this shared power between process owners and functional line managers can lead to coordination challenges as well as conflicts of interests (Chenhall, 2008; Damij et al., 2014). By this means, top management is responsible to solve occurring challenges by on the one hand taking the final decision and on the other hand live and encourage others to think process oriented (Damij et al., 2014). We argue that these challenges can also affect the set and use of performance measures due to the problems with accountability of who takes the final lead of developing and improving the measures. This challenge is however qualified if top management takes the lead, but this could raise other problems concerning the relevance of indicators.

Besides the mentioned benefits and recognition of BPM, it also received some critical words in the literature. Hereby, Silva et al. (2012) noted that the implementation of BPM with regards to process orientation rather promotes and increases the complexity for management activities and organizations. Moreover, it has been argued that the BPM methodology “*does not correspond to standard economic justification methods*” due to its strategic effort with rather long-term results than short-term improvements (Elzinga et al., 1995:127). Nonetheless, since BPM is a quiet recent methodology, practitioners as well as scholars are still expanding and exploring this topic. Subsequently, Neubauer (2009) noted that most of the participating companies in his survey are still in the implementation phase of a process oriented view and therefore the BPM methodology.

## 3.2 Performance Measurement Systems

Generally, measurement is a process of shifting from a messy reality into the much more ordered and tidier world of numbers (Gray, Micheli and Pavlov, 2015) in order to support managerial analysis, evaluation and decision-making (Otley, 1999). According to Ferreira and Otley (2009), a PMS should include strategic formulation, strategic implementation and ongoing management. On the other hand, Kueng (2000) defines PMS as an information system that (1) gathers relevant data of performance through the set of indicators, (2) compares current values with historical or planned values, and (3) provides process actors and managers with relevant data. Most researchers agree that goal orientation and the company's long-term success rely on performance and how objectives are carried out to its effect (Sahoo and Jena, 2012). However, literature emphasizes different definitions for performance measurement and performance management. Bititci, Carrie and McDevitt (1997) see performance measurement as a process, which supports the management of performance in line with corporate and functional strategies and objectives. In this part, performance measurement provides and integrates related information. Ferreira et al. (2009) argue that performance management systems enable organizations not only to measure, evaluate, improve and reward employee performance, but also to support organizational learning and capture informal controls. This description entails a complete picture and integrates contextual and cultural factors as well as rewards systems and the management of functions and processes. Consequently, both definitions are very closely related, so that according to Otley (1999), Neely (2005), and Sahoo et al. (2012) a performance measurement system is the core of a performance management system supporting company's strategy. That is supported by Lebas (1995), who stated that performance management creates the context of performance measurement that leads performance management.

Researchers identified characteristics that the majority of successful performance measurement systems share. Most of the commonly used frameworks include financial and non-financial performance measures (Kaplan et al., 1992; Neely et al. 2001; Ittner and Larcker, 2001; Bontis and Nikitopoulos, 2001; Venanzi, 2010). The purpose of the frameworks is to visualize intangible assets that create future value and supports manager's decision-making (Bontis et al., 2001). In for-profit organizations, the maximization of shareholder value is of highest priority (Venanzi, 2010). That means that value drivers (i.e. non-financial performance measures) create future (stakeholder) value through intangible assets. Additionally, researchers highlight that the systems provide a holistic and balanced view of the entire organization (Kaplan et al., 1992; Ittner et al. 2001; Neely et al., 2001). This is done through multidimensional performance measures integrating both across organizational functions and hierarchies (Kaplan et al., 1992). The aim of these systems is to measure performance of all areas, as categorized e.g. in the Balanced Scorecard: financial perspective, customer perspective, internal perspective and learning and growth perspective (Kaplan et al., 1992). This helps to manage

performance of each employee, team and process to enable an efficient and effective management, consistent goal alignment and the alignment of operations with organization's strategy (Sahoo et al., 2012). Operational indicators and objectives with targets are actively derived from organization's missions and visions and its identified key success factors (Van Looy et al., 2016). Consequently, it is essential to set the objective in order to clarify what and how to measure. The measurements can focus on e.g. performances of individuals, teams, processes and functional units. Most frameworks focus on one or two stakeholders, which simplifies the focus and alignment to strategic decisions and organizational goals (Bontis et al., 2001). The success of some PMS is due to the facilitation of the understanding for the employees and the uncomplicated use and connection of performance measures. Effective usage of measurement systems is crucial to foster organizational performance and achieve competitive advantages in the global marketplace (Sahoo et al., 2012). Another aspect of the PMS success is the use to enhance learning and facilitate the change in roles to foster the emergent strategy (Mintzberg, 1978). Through measurement, analysis and evaluation of performance, the company should be able to learn from the outcomes and consider this information for decision-making. Consequently, not only the question of what and how to measure is important. It is also essential how to use this information and set evaluation criteria for the measurement. Merchant and Van der Stede (2007) summarized these criteria for the usage of measures and measurement systems: congruence, controllability, precision, objectivity, timeliness, understandability, and cost efficiency to evaluate, compare and contrast each measurement. The choice of measures depends on what is wanted to achieve (structure, process, outcome) in relative or absolute targets and depends on what is possible to measure (direct, indirect) in order to be able to relate all measures in a system that supports business improvement on operational, tactical and strategic level (Han et al., 2007).

Performance measures are essential indicators whether the company's strategy is well implemented and contribute to the improvement of the company or not (Kaplan et al., 1992). In order to understand the concept of PMS and its design for a company, it is important to comprehend the purpose and the requirements of a PMS. This is important, since the idea of performance management is part of and necessary for improvement in business processes and considered steps for process reengineering. Otley (1999) summarized the issues that should be considered to develop a coherent structure for a performance management systems. This framework goes "*beyond the measurement of performance to the management of performance*" (Otley, 1999:364). Five issues have been identified, which should be included when developing a performance management system. Important are (1) the identification of key organizational objectives and the level of achievement in these objectives, (2) the formulation and implementation of strategies and plans, as well as the performance measurement and evaluation processes, (3) the setting of performance targets and the set level of those targets, (4) the attention to rewards systems used by organizations, and (5) the types of information flows required to provide adequate monitoring (Otley, 1999). This proposed framework facilitates the understanding of the



purpose and structure of a PMS in its nature and can be used as guideline for other frameworks since it is straightforward and clear addressed according to Ferreira et al. (2009). However, this framework shows several weaknesses, such as (1) the lack to include vision and mission, (2) focusing too much on diagnostic control systems, (3) not stressing the use of accounting and control information, and (4) looking too static on control systems by ignoring dynamics and flexibility of control change and development. Therefore, Ferreira et al. (2009) extended this framework to provide and describe a structure and operation of PMS in a holistic manner. In here, they provided a tool describing the use and structure of this framework by raising twelve questions at different hierarchical levels concerning design, usage and interconnection of the different parts of the PMS. Nevertheless, contextual factors and organizational culture are not included, but could be considered in the evaluation, as they are seen as contingent factors that can explain certain patterns within (Ferreira et al., 2009).

The characteristics for PMS show that these systems can be extremely helpful tools to gather data and information for decision-making and business improvement. Yet, with the introduction, development and use of a system for performance measurement, researchers have identified challenges and pitfalls that may occur. Bontis et al. (2001) criticized that most frameworks ignore changes that must be made by the organization. That means that the existing frameworks lack adaptability and responsiveness and therefore lack flexibility in their general use. Changes may occur on strategic, process or operational level. Furthermore, Bontis et al. (2001) claimed that most frameworks do not consider what stakeholders contribute to the organization. Moreover, Ittner and Larcker (2003) identified problems for the usage of measurements within this system. Common mistakes in a PMS are that measures are not linked to strategy and do not support the correct objective. The measurement may become obsolete and useless. Also, the links to strategy are not valid or not correct, so that the measurement fails to contribute to the goal of the process, organization or division (Ittner et al., 2003). Additionally, a wrong measurement, the wrong target or the way the measurement is taken can also harm the efficiency and effectiveness of the entire system. Next to that, users of such systems have to be aware that (1) performance is not absolute, meaning that performance may vary depending on the process, (2) performance is multidimensional, so that it cannot be gathered by a single indicator, and (3) performance indicators are not independent meaning that indicators stand in relation to each other and may be (depending on the relationship) either conflicting or complementary in its existence (Ittner et al., 2003). In their book, Gray et al. (2015) warn of the consequences of excessive reliance on measurement and PMS. They claim that in general a PMS is extremely important in organizations, but before investing heavily into a PMS, they suggest to conduct a cost/benefit analysis, since the extensive use and reliance of measurements might harm organizations. Consequences are (1) fixating on measures, (2) getting desensitized to numbers, (3) getting lost in performance data, (4) enormous costs for the company (Gray et al. 2015).

One objective of a PMS can be to provide information about performance in or of processes. This purpose is a relatively new empirical area within literature. It entails the understanding of BPM and PMS as one integrated part. The approach of organizing a business in processes rather than in functional areas should be supported by a tool that considers this bundle of interconnections between activities and decisions (Vernadat, Shah, Etienne and Siadat, 2013). The use and design of the performance measurement system should support business operations in general and provide managers with data to facilitate decision making (Ferreira et al., 2009). Due to recent developments in the creation of process orientation in organizations, Hernaus et al. (2012) suggested future research to focus on the strategic approach of performance measurement in general and on process performance in particular. They saw this research area rather underdeveloped in terms of empirical studies, so that additional effort is needed to complete the bigger picture. In general, PPMS can be described as a special type of PMS that is used in process-oriented businesses (Glavan, 2011). Some researchers argued that through the introduction and development of BPM, PMS should be modified (Taticchi, Toneli and Cagnazzo, 2010). In order to allow companies to identify relationships between processes and to recognize performance practices that could potentially offer significant improvements for these processes (Hernaus et al., 2012). Kueng (2000) characterizes a performance measurement system already according a PPMS taking the three key points of a PMS into consideration. He describes users as process actors, so that Kueng (2000) already points to the necessity towards process performance thinking.

In order to be capable to introduce a solid and adequate PPMS, organizations have to meet several requirements. The purpose is to develop a measurement system that supports process orientation and is concurrent with strategic or organizational objectives. A lot of researchers and studies showed that process orientation in a business and process oriented designs improve company's performance (Kohlbacher et al., 2010). Next to integrating all information of processes (Bititci et al., 1997), it should help to identify relationships between processes and the company (Hernaus et al., 2012). The objective of a PPMS is closely connected to BPM. Consequently, a PPMS should support the organization in the same way as a PMS considering a different objective and integrating the measurement and management of processes. The goals of a PPMS are similar to the ones provided by Kaplan et al. (1992) with the introduction of the Balanced Scorecard.

However, several researchers developed these goals. Kueng et al. (1999) have been the first researchers, who summarized the main functionalities and features of a PPMS while designing a PPMS concept model. Further, Kueng (2000) listed two major requirements that a PPMS should fulfil: (1) the measurement system should rather focus on processes than on the entire organization of functional areas and (2) the system should measure quantitative as well as qualitative aspects to be able to evaluate performance on a holistic level. Nevertheless, Wieland, Fischer, Pfitzner and Hilbert

(2015) criticized this approach as being on a very vague level of abstraction and not dealing with the identification between the selected indicators. We agree that these requirements are very vague and that possible tensions between process views and functional areas are not disclosed. Additionally, we believe that a differentiation between process types and consequently categories of performance measures does not exist.

Kueng (2000), Tupa (2010) and Kohlbacher et al. (2011) set precepts and requirements specifically process performance measurement systems. To summarize, a PMS supporting process orientation should (1) be derived from the from enterprise goals, (2) collect and provide process performance data on a continuous basis, (3) detect and report weaknesses and problematic situations by providing warning signals, (4) present transparency of metrics in data towards process actors, (5) use metrics for process benchmarking, (6) assess the impact of actions taken, and (7) help to find optimization options and evaluation of success of improvement measures. Furthermore, it is said that PPMS should connect and link bottom-line results, i.e. performance on operational level towards the strategic level (Hernaus et al., 2012). The alignment of operational, tactical and strategic level through the right set of indicators and use of measures has to be elaborated (Bosilj-Vuksic et al., 2008). It is important to align the process orientation and the measurement system in order to evaluate starting points to be able to start reengineering of operational process and improve support- and project-related processes. Although these requirements seem extremely generalized, one should keep in mind the special focus towards processes and process orientation. However, these requirements could also be applied for measuring different purposes, such as individual-, functional- and project-related performance. This process measurement is still only a part of the broader view of process controlling or CPM, as some researchers refer to the principle of managing processes on the highest managerial level in an organization (Tupa, 2010).

Challenges for the development of a PPMS can be various and are generally related to the integration of a system measuring performance in the idea of process orientation. An approach to integrate a PPMS can start by defining business processes level-by-level and map the key performance measures to each process. This decomposition of business process into sub processes to gain an overview and increase transparency is crucial to sum the measures and align them with the processes (Beretta, 2002; Chan and Qi, 2003). Nonetheless, Vernadat et al., (2013) identify that it might be challenging to consider that interconnections and interrelations between both the processes and the KPI's on certain levels. Also, it seems difficult to apply a modelling system and consider at the same time multiple relations and the weights of KPI's, since each KPI within the system contributes differently and has a certain weight, which affects the performance indicator on the tactical and strategical level. That could lead to the problem of not being able to trace processes and sub process towards KPI'S and link them together, so that the KPI's on operational level contribute effectively and efficiently for the evaluation

of performance and consequently support business improvement (Han et al., 2007). The comprehension of cause-effect relationships is the dependent factor for the effective and efficient use of KPIs to monitor company's performance. The integration of performance measures that support BPM is complex, since the supporting KPI model and the set and use of performance indicators within the system can vary in amount and control aspect (Han et al., 2007). The set of measures can give the managers an illusion of control, which is necessary to achieve goals or move things in the desired direction, but the control becomes unnecessary when the set of indicators in the process is failing the actual purpose or failing to measure effectively (Gray et al., 2015). Hence, there is the need of a clear guideline to deal with gap-related problems (Taticchi et al., 2010). There are two major gap-related problems. On the one hand, companies struggle to effectively translate information coming from measurements into effective tasks, since there is insufficient knowledge about cause-effect relationships. On the other hand, there is the change from a functional structure towards a process-oriented (or matrix) structure leading to coordination problems between existing divisions and process owner regarding responsibility and accountability. These gaps between cause-effect relations and lack of coordination need to be addressed during the implementation of a PPMS. Taking these factors into consideration, it points towards that performance cannot be measured without considering the management of processes in order to attain strategic alignment and achieve company's objectives. The right set and use of indicators within a process-related performance measurement system can be seen as crucial to work successfully and in the very end ensure company's survival through the correct application of measurement systems.

### 3.3 Performance Indicators

#### 3.3.1 Key Performance Indicators

Evaluation of performance is an essential task of every organization. It enables them to achieve its strategical, tactical and operational objectives. Particularly for process-oriented organizations it is representing a key success factor to identify the processes that are essential for value creation and streamline processes to increase quality, reduce time and waste (Weske, 2012). Consequently, process oriented organizations should focus on process performance to work towards these goals (del-Río-Ortega, Resinas, Cabanillas and Ruiz-Cortés, 2013). Furthermore, through the evaluation of the process performance, potentials for process improvements can be revealed. In order to address the evaluation of process performance, special process performance indicators, a more specified version of key performance indicators, can be used to carry out these tasks (del-Río-Ortega et al., 2013). We argue that to understand the requirements for the set and use of key performance indicators and process performance indicators, it should be first clarified what performance means and then taking this definition to explore KPIs and PPIs.

The term performance can be used in many different contexts. Consequently, the variety of definitions is high. However, this thesis takes the definition from a business perspective in consideration. According to this, performance can be described as a holistic value determined by the “*realization accomplished by an actor (system, person, or organization) compared to the objectives of its activities and the requirements of its functions (effectiveness), and balanced by the cost of achieving these objectives and meeting these requirements (efficiency)*” (Shishmanian and Bogdan, 2008:4). It should be stressed that effectiveness and efficiency can be also be seen as dimensions of performance, whereas effectiveness means to achieve set targets and efficiency to achieve targets less costly (Shishmanian et al., 2008). Associated with this definition, key performance indicators are indicators, which are critical for the evaluation of performance. Furthermore, each indicator is connected to their objectives, requirements, costs and the measured components (Shishmanian et al., 2008). Consequently, through the use of key performance measures, performance can be evaluated in terms of effectiveness and efficiency. Moreover, we argue that through the right set of KPIs, performance improvements can be evaluated.

The determination of the right set of performance indicators, taking the business process management perspective in consideration, can be challenging. Nevertheless, Bosilj-Vuksic et al. (2008) suggest that performance indicators should be set in four different areas, namely (1) financial related performance, (2) customer-related performance, (3) internal business process performance and (4) learning and growth related performance. Hereby, the performance indicators should function as tool to enable managers to draw conclusions of “*the effectiveness of the processes (e.g. customer satisfaction) and their efficiency (e.g. processing time, delivery reliability, process quality and costs)*” (Tupa, 2010:25). It can be noticed that time, cost and quality measures are drivers of the goals of process orientation. These four categories have been derived from the four perspectives of the Balanced Scorecard from Kaplan et al. (1992). This reason behind the adoption of these four perspectives has been already examined greatly in previous literature (Van Looy et al., 2016). Hence, financial related performance and the entailing indicators can be further described as lagging indicators fostering long-term improvements and effects (Hernaus et al., 2012). Subsequently, the indicators within the three remaining areas can be seen as leading indicators, which are essential for short-term performance improvements (Hernaus et al., 2012). We argue that the right set of performance indicators entails leading indicators as well as lagging indicators. With that being said, another important aspect with the set of performance indicators is the amount of measures applied to evaluate the performance. Supporting this argument, Wieland et al. (2015) noted that the right amount and the right measures are critical for the success of an PPMS. Accordingly, the right performance indicators should be able to support managers in their decision making by providing qualitative information. However, wrong indicators, too many or too few can distort and influence the decisions resulting in possible declining performance (Wieland et al., 2015). Consequently, to determine the

right amount of right measures, the entire set of performance indicators have to be reviewed and only appropriate ones should be executed in practice (Bosilj-Vuksic et al., 2008). To tackle this challenge of determine the right amount of performance indicators, Wieland et al. (2015) propose that the number of measures can be found by assessing the overall performance of a process and then identify the lowest possible set of indicators generating acceptable performance. This principle is based on avoiding errors to maximize success (Robson, 2004). Yet, it should be noted that the determination of the right amount is also a balance between the ability to learn and understand the origins of performance (more measures) as well as accountability and pure measurement (few measures) (Larsson, 2016). Nevertheless, this determination is not static, emphasizing that the set of performance indicators should be continuously reviewed and if necessary adjusted according to their timeliness and usefulness (Wieland et al., 2015). In this connection, Nenadál (2008:464) argues that for process performance indicators, rather the entire set of indicators, which “*describes and explains the behavior of the process*”, is significant than the amount of indicators. We question the statement that the number of indicators is not significant, since performance measurement is largely described as time consuming and costly (Bosilj-Vuksic et al., 2008).

Taking one step back again to the ability of performance indicators to support manager's decision making: this requires a manager or responsible people within an organization to understand the indicator. Previous empirical studies found that the understanding of indicators, their purpose as well as the relation to the organizational goals and other performance indicators are highly important to avoid a decline in performance (Gray et al., 2015). Taking this understanding, it further implies that performance indicators need to be connected to these goals. Accordingly, the required strategic alignment has been already mentioned in section 3.1 and 3.2 as one critical success factor of performance measurement. Therefore, it should be clear that performance indicators need to be aligned throughout strategic, tactical and operational level and be interrelated to each other (Bosilj-Vuksic et al., 2008). However, the main challenge lies in the identification and set of performance indicators integrating strategic goals with process performance (Hernaus et al., 2012). Hereby, the starting point for the development and implementation of a comprehensive performance measurement system, which entails performance indicators to support BPM, should start at the operational level towards the corporate strategy according to Bosilj-Vuksic et al. (2008). Or in other words, the implementation should start from a process view upwards. Therefore, every set of performance indicators, especially process performance indicators, can be seen as unique since they are directly aligned to fit the processes and company's strategy (Gray et al., 2015).

### 3.3.2 Process Performance Indicators

Besides key performance indicators, process performance indicators are special tailored performance indicators for business processes to ensure their performance. By this means, PPIs can be defined as “*quantifiable metrics that allow the evaluation of the efficiency and effectiveness of BPs*” (del-Río-Ortega, Resinas, Durán and Ruiz-Cortés, 2016:159). Accordingly, to ensure that these process measures are effectively deployed, they should be aligned throughout the measurements, meaning linked from a process/operational level to tactical and strategic level KPIs (Robson, 2004; Nenadál, 2008; del-Río-Ortega et al., 2016). This alignment can be achieved, as explained, when the development of these measures starts from a process goal perspective and then consequently connected upwards the hierarchy (Robson, 2004; Kohlbacher et al., 2011). However, it should be noted that the process goals should be derived from the overall organizational goals, which can be described as top-down development (Kohlbacher et al., 2011). Accordingly, the alignment between strategic goals and process performance indicators aims to support the determination of whether the organization reaches its goals or not (Nenadál, 2008). In addition to the alignment, it seems crucial to monitor and measure process performance indicators to drive continuous process improvements and ensure the aspired alignment (Folino, Guarascio and Pontieri, 2015; del-Río-Ortega et al., 2016). Subsequently, from the definition of process performance indicators, requirements regarding their quality can be derived. These requirements consist of the possibility to quantify and that measures should be sensitive, linear, reliable, efficient, focus on improvements and accepted (Wieland et al., 2015). Further requirements have been examined by del-Río-Ortega et al. (2016), who states that process performance indicators should be set according to SMART criteria, should be understandable, traceable and automatically analyzable. Subsequently, we argue that these requirements can be seen as challenges for organizations during the development and application of process performance indicators as well as performance indicators in general. This implies that the requirements to indicators are similar. Wieland et al, (2015) suggest that the more the indicator fulfils these requirements, the higher is the quality of this indicator. Subsequently, the definition of a process performance indicator can be executed from an (1) informal case-by-case perspective or from a (2) very low level implementation perspective. Nonetheless, the challenges associated with definition scenario (1) is that indicators tend to be ambiguous, can lack alignment with processes leading to a disregard of information and might be not applicable for automated analysis. On the other hand, in scenario (2), indicators tend to be too narrow to a technical perspective leading to not understandable measures for managers and loss of alignment to main processes (del-Río-Ortega et al., 2013). In both definition types, managers need to be supported by appropriate IT solutions, which plays a major role in business process management as per definition (del-Río-Ortega et al., 2013; van der Aalst et al., 2003, cited in Neubauer, 2009:167). Regardless of their definition, performance indicators should not

be used purely to take decisions since they act more as guidance due to their connection to events that might need supplementary considerations (Shishmanian et al., 2008).

### 3.4 Summary to the Type of Challenges Described

In this chapter, we present the key concepts to business process management, performance measurement and performance indicators with regards to their implementation and associated challenges. To answer research question number one, the challenges can be summarized in two interrelated categories. Hereby, Table 3 below displays the two categories and associated challenges.

*Table 3 - Business Process Management Categorized Challenges*

<b>Company/technical related challenges</b>	<b>People related challenges</b>
Business process alignment and integration with corporate strategy and long-term goals (Neubauer, 2009; Hernaus et al., 2012; Silva et al., 2012).	Management involvement and know-how for the analysis, design, implementation and optimization of business process management (Neubauer, 2009; Silva et al., 2012).
Definition and design of performance measures to support business process management, which is critical for organizational success (Bosilj-Vuksic et al., 2008; Silva et al., 2012).	Definition of accountabilities and responsibilities for the development, improvement of business processes as well as performance measures (Chenhall, 2008; Damij et al., 2014).
Process elaboration into core -, sub -, and management processes (Beretta, 2002; Chan et al., 2003)	Handle increased management tasks and organizational complexity (Silva et al., 2012).

We are certain that these two identified types, namely company/technical related and people related challenges can also be applied to performance measurement systems, since it is an integrated part of BPM. Therefore, Table 4 below displays the associated challenges within the implementation of a performance measurement and process performance measurement system in the same categories.

*Table 4 - Performance Measurement Categorized Challenges*

<b>Company/technical related challenges</b>	<b>People related challenges</b>
Lacking, invalid or incorrect link of measures to strategy, objectives or processes (Ittner et al., 2003)	Missing awareness of cause and effect relationship between performance measures (Ittner et al., 2003)
Correct way of measurement, correct targets and correct measurement (Ittner et al., 2003)	
Adaptability, responsiveness and flexibility to answer to changes (Bontis et al., 2001)	
Interrelation and links between measures on operational, tactical and strategic level (Han et al., 2007; Bosilj-Vuksic et al., 2008; Hernaus et al., 2012)	
Elaboration of measurement system to support core -, sub -, as well as management processes (Beretta, 2002; Chan et al., 2003)	



Furthermore, the two categories can be broken down to the challenges of the development and implementation of performance indicators. Table 5 below summarizes challenges regarding to the set and use of indicators.

*Table 5 - Performance Indicators (KPIs and PPIs) Categorized Challenges*

<b>Company/technical related challenges</b>	<b>People related challenges</b>
Determine the right amount of leading and lagging measures (Wieland et al., 2015)	Understandable indicators with purpose and relation to company goals (del-Río-Ortega et al., 2013; Gray et al., 2015)
Interrelation and interconnections between indicators on strategic -, tactical - and operational level with different weight in effect to performance (Robson, 2004; Nenadál, 2008; del-Río-Ortega et al., 2016)	
Definition and application of indicators according to the quality criteria of indicators (Wieland et al., 2015; del-Río-Ortega et al., 2016)	

It can be noted that people related challenges are more present within an implementation of the business process management methodology, whereas in performance measurement systems and especially in the use and set of performance indicators, people related challenges stop short.

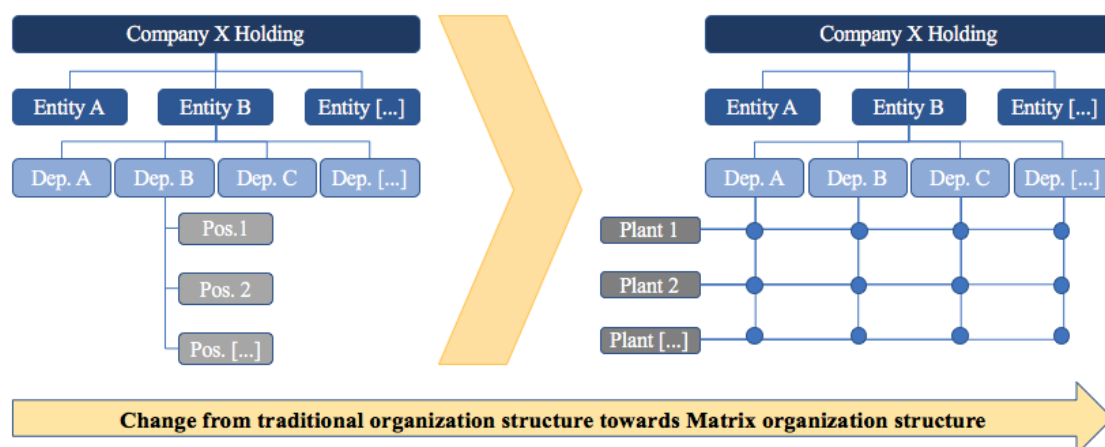
## 4. Empirical Findings

*In the following chapter, the empirical findings derived from the conducted interviews and supporting data will be provided to answer research question two. The aim is to describe the company's development towards process orientation and experienced challenges concerning the development and implementation with regard to the set and use of performance indicators. Hereby, the chapter is subdivided into sections concerning contextual factors, the change towards process orientation and performance measurement. It concludes with a summary of the empirical findings.*

### 4.1 Contextual Factors

Company X is a German family-owned company founded at around 1900. Rooted in the north of Germany, Company X succeeded to expand steadily and nowadays operates worldwide in the automotive manufacturing industry. By this means, the yearly turnover amounts between 1 - 5 billion Euros largely generated through export in 2016. The amount of sales is divided to several separate entities. These entities are finally hold by the Company X Holding Group. During the years 2000 to 2010, Company X worked closely together with another company, Company Z, under a strategic alliance relationship. After 2010, Company X merged with Company Z to create a new entity owned by Company X Holding Group. This decision was driven by the desire to foster profitable and sustainable growth. Consequently, the creation of this new entity resulted in a project focusing on a drastic reorganization and strategy revision. Accordingly, Company X introduced the new concept of business orientation through business process management and furthermore changed the organizational structure from a traditional to a matrix organization. Figure 1 below displays this change in at Company X.

Figure 1 - Company X change in Organizational Structure<sup>5</sup>



Source: Company X, 2016

<sup>5</sup> Simplified illustration of Company X's organizational structure.

Besides the change and development in the corporate strategy and organizational restructuring, a performance measurement system, entailing performance indicators had to be set up and used to support the new strategy and finally support performance improvements.

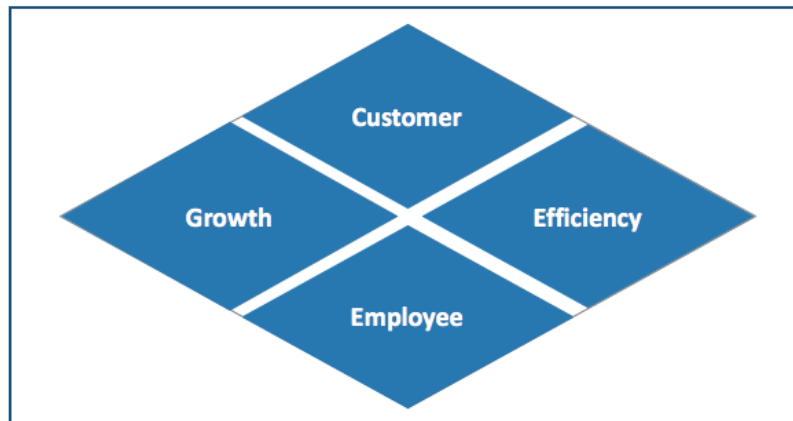
## 4.2 Change Towards Process Orientation and Business Process Management

In order to understand the new organizational structure and working habits, the reasons for this radical change need to be highlighted. The CFO stated that *“through strong growth, the complexity in the organization increased significantly.”* This is also seen by most of the interviewees, who see the change necessary to respond to organizational growth. This growth is even more fostered through the merger and the creation of various small entities in manufacturing, sales and service areas of the company. Furthermore, growth is manifested as one pillar of the new developed strategic goal and plays a major role in the future development of the company. Accordingly, based on this growth and increase of complexity, some interviewees stated that the company has suffered previously of non-transparent work procedures and unclear responsibilities. Furthermore, it was noticed by several interviewees, that the projects and the work procedures themselves, for each employee, has increased in complexity making the change to a process oriented management necessary. A statement of one member of the Executive Department of BPM combines the internal and external factors: *“We have to structure, standardize and guide chaos, which should be allowed and controlled in the organization, to be ahead of the competition.”* This would also entail to focus only on essential processes that deliver value to the company and as a division manager said: *“With our new organized process landscape, we will save money.”* It is said by some interviewees that this would mean to work cost effective and efficient within the new matrix organization. One member of the Executive Department of BPM claimed that the organization *“must shift from the organizational silo thoughts”* to work in a more collaborative manner and deliver combined offers and solutions to the customers. It corresponds to the new developed product and service catalogue of Company X and is also linked to the new strategic goals. This is supported by several employees, who stated that the company should be more focused on customers to maximize customer value.

### 4.2.1 Anticipated Goals of Process Orientation

Within the strategic reorganization, Company X defined and established a new strategy with strategic objectives. From these goals, areas for further development in the change process have been identified and need be executed later. Hereby, the goals are defined to be achieved within a specific time frame. Figure 2 below highlights these four goals according to internal documentation.

Figure 2 - Four Strategic Goals at Company X



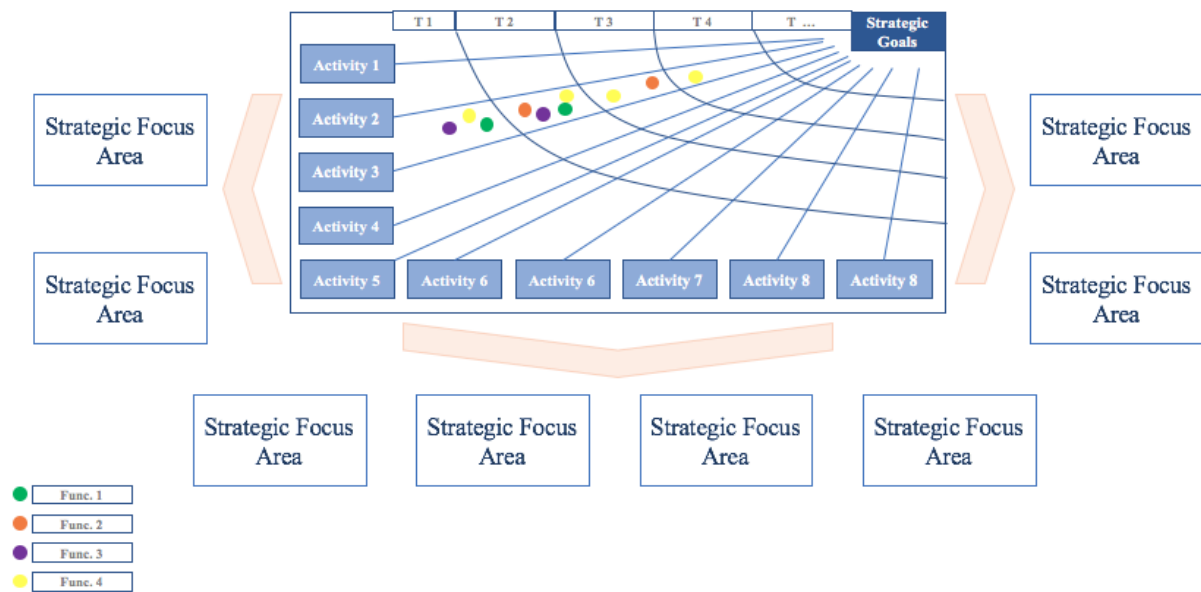
Source: Company X, 2016

Accordingly, through the new process orientation and business process management, the company's goal is to sustain its growth, increase efficiency and optimize its processes. One division manager defined: *"Primarily, the focus lies on productivity, reduction of costs and increase of quality. In order to achieve these goals, other factors are derived from them."* However, there is agreement that one of the most important achievement for the process orientation will be an increase in collaboration and the use of synergy effects. That means that this change should create a *"solution-driven culture"* (Member of the Execution Department of BPM, 2017) in which challenges are solved in a cross-functional way. Moreover, important goals are the support for employees, increase of market share and customer satisfaction. Some interviewees mentioned that these goals should be attained through several other factors. One important aspect, which some interviewees especially in the Department of Execution of BPM have mentioned is the creation of standards in work procedures. By this means, these standards aim to provide guidance for the employee in the functional areas to increase efficiency and effectiveness. Additionally, on the one hand, the overall transparency should be increased to learn from best practice. On the other hand, it aims to reduce waste in optimized processes. The CFO concluded: *"Through transparency in the process environment customer satisfaction, quality and efficiency will be ensured."*

#### 4.2.2 Steps Undertaken to Change Towards Process Orientation

To achieve the four strategic goals (i.e. customer, efficiency, growth and employee), Company X developed in cooperation with an external consultant company a roadmap of strategic initiatives with binding steps to achieve the anticipated goals within the set time frame (colored points represent these steps). Hereby, these initiatives are subdivided into different categories (categories displayed as activities) and times when they have to be completed. Figure 3 displays the strategic roadmap with the strategic focus areas (example areas are sales, service, product development).

Figure 3 - Company X Strategic Roadmap Including Strategic Focus Areas



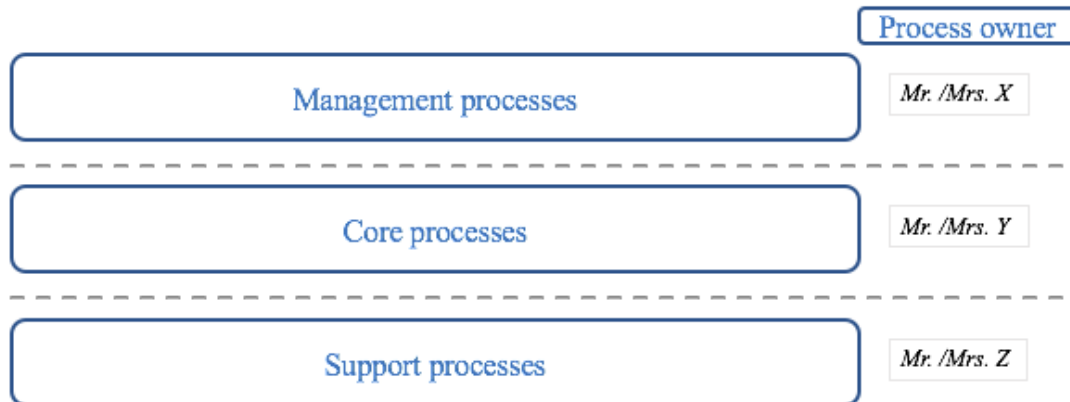
Source: Company X, 2016

These initiatives are interrelated and cross-functional. Within these strategic initiatives, the company set milestones, which are crucial to reach in order to move forward towards the overall objectives. Most interviewees expressed that every initiative can be traced back to specific processes and functions (color represents function and process), so that the matrix structure is sustainably developed and implemented. However, some interviewees emphasized that in these strategic focus areas, collaboration between departments will be crucial since employees have to work together in project groups towards a joint solution and subsequently towards the strategic goals. One member of the Execution Department of BPM stressed: *“It is crucial that managerial staff is living the matrix structure and the process ideas to ensure sustainable success for the implementation.”* The entire concept represents one part of the organization’s new business process management and management control system. From these initiatives and objectives, goal corridors have been derived, which are part of the performance measurement system. The Head of Strategy stated that: *“performance measures are crucial to manage, control and improve the progress of achievement.”* Nonetheless, the use and set of indicators in this case are explained in section 4.3.

Having this strategic roadmap at hand with the specific initiatives and strategic objectives, the company started to identify and define processes with focus on the current-situation and the desired process landscape. Most interviewees explained that this definition of the process landscape was conducted through a top-down approach. That means that first, the management processes were defined. From here, core process on tactical level were derived and process owners with the connected responsibilities and accountabilities were assigned. In the final stage of this general definition, supporting processes were elaborated with connected process owners. These process owners, on the

operational level, are responsible to define further supporting processes within the functional areas and their units. A simplified version of the process landscape from Company X can be seen in Figure 4. However, some interviewees emphasized that process owners have to work together and collaborate with line managers. In fact, this can also be evidenced by the new organizational matrix structure presented in section 4.1.

Figure 4 - Example of Different Processes at Company X



Source: Company X, 2016

In specific, the development entailed several steps involving management and division managers. The members of the Execution Department of BPM stressed that the communication of the strategic goals included a workshop with top management and second line managers explaining the change towards process orientation. Afterwards, the second line managers were delegated to inform their subordinates about the new approach of process orientation and the associated changes through for instance e-mails, on blackboards or projects in which employees were actively involved. From defined objectives, clear process-steps, entailing current, and target situation were specified. This step included the definition and evaluation of process targets and related process drivers as well (i.e. cost and capacity). Simultaneously, to improve the lack of transparency and accessibility of work procedures, process standards were documented. One member of the Execution Department of BPM said that *“the introduction of the tool to publish the new process landscape via Intranet is one part to foster collaboration and helps to create a solution-driven culture.”* This process portal stores processes, process owners and responsibilities.

#### 4.2.3 Challenges Experience in the Process of Change and Possible Solutions

Within the steps undertaken to change to a process oriented organization, Company X is and has been facing challenges. The employees identified challenges in different areas and different possible impacts on the implementation and change to process orientation. The CFO claimed that one major challenge will be *“the anchoring of process orientation in the corporate culture.”* Additionally, a

member of the Execution Department of BPM said that managers have to lead and guide the workforce,” *This is necessary to successfully implement the new organizational structure and complete this change.*” The CFO added: *“Change always means something new and new in principle is tiring. New also means to leave the so-called ‘Comfort Zone’ to change requirements and break up old structures, and this may lead to resistance.”* One division manager sees leadership even as one key driver for the successful change. *“They need to convince, motivate and get the employees going in their functional areas”* was stated by the Head of HR. In order to cope with this issue, the company has enforced leadership workshops and intends to increase communication between management and employees. There is the need to *“live the process orientation on every level of the organization, but it starts on top and we should act as role models to change the mind in the company”* was noted by one Member of the Execution Department. Accordingly, interviewees claimed that there is a lack of communication regarding business process management. Furthermore, some Division managers noted that the challenges in communication are related to the allocation of responsibilities, compromises in quality of decision making and a lack of transparency. They added that communication needs to be enhanced and transparency should be fostered, e.g. by the publication of a structured process environment and clear guidelines for decision making. Additionally, several interviewees mentioned that the company is still lacking the IT support although some concluded that this issue is currently in development.

Another challenge is the shift in the organizational focus, from a previously productivity driven to a more customer driven organization. However, some interviewees noted that the intensity on customer focus seems to be uneven. The CFO explained that *“the final integration and implementation of a functioning matrix organization needs time”*, which might be the reason for this imbalance.

#### 4.3 Performance Measurement and Process Performance Measurement System

Next to the development of process orientation and the introduction of a matrix as organizational structure on the operational level, the performance measurement and management is under constant revision and evaluation. Based on the strategical areas (i.e. customer, employees, growth, efficiency), the company created a strategic matrix, which serves as the groundwork for setting the correct performance indicators. Through the matrix, management wants to ensure that all functional areas work towards the same strategic goals. Figure 5 below displays a simplified version of the strategic matrix from Company X.

Figure 5 - Strategic Matrix at Company X

Company	Product	Development	Production	Sales/ Service
Customer	Customer satisfaction and quality	...	...	...
Employees	Qualified and motivated employees	...	...	...
Growth	Market share > X %	...	...	...
Efficiency	Return on sales > X %	...	...	...

Source: Company X, 2016

As mentioned by interviewees, the change towards process orientation requires the company to rethink the set of performance indicators and the reporting structure of these indicators. The strategic matrix should help to align the set of indicators on operational and tactical level towards strategic goals.

Most of the interviewees stated that major indicators were developed in a top-down approach in cooperation with the second management level. With the help of the matrix defining the guiding principles, top management and the next management level consult and derive KPIs from the four areas. However, the CFO stated: "All performance measures are in the end subordinate to financial indicators, which are the drivers of the company." Having all four areas in mind, the top management together with the first subordinates broke down the indicators to measures and targets, which are designated for the next lower level (i.e. tactical level). Top management is aware that the link between objectives and critical success factors is crucial for the company's long-term success and the realization of strategic goals. This elaboration of KPIs is important for the further breakdown of indicators on operational level. On the lowest level, division managers with their expertise are responsible for the definition of indicators. Here, depending on the purpose of measurement, a division managers said that adjusted standard industry indicators are considered in combination with identified drivers for cost and capacity. Some members of the Execution Department of BPM stated that specific process related indicators and the decision of usage are depending on process maturity, since the company is still in the development phase for defining processes on operational level. When the process is already in place and the maturity allows the usage of process-related indicators, division managers and process actors are responsible for their application. Nevertheless, some interviewees



mentioned that the company is still inexperienced in the development of process-related indicators, since it is a whole new area for the entire organization. Moreover, it was stated that the reorganization of the company into a matrix structure on operational level is an ongoing process.

The interviewees agreed that financial measures are used heavily. Also, most decisions and actions are currently made based on financial performance on strategic as well as lower levels. Moreover, most of the interviewees stated that with the start of the introduction of process orientation, it has not changed yet. This is supported by the CFO who claimed: *“Performance indicators in relation to process performance are subordinate to financial indicators.”* However, he added that they are necessary to evaluate and understand the background of financial performance. Indicators, which support and measure internal performance are lacking behind and do not support process efficiency based on some interviewees. They claimed that process indicators currently are still lacking the focus in supporting an increase of process performance. One member of the Execution Department of BPM stated: *“We are still in the identification and implementation phase of our processes, which has major impacts on the entire set of indicators.”* Furthermore, there are currently no or only a few indicators regarding either employees or customers. Hereby, the responsible managers stated that there are measures, for instance retention rate and customer reclamations. Nevertheless, indicators such as customer satisfaction and employee satisfaction should be measured in the future. One division manager expressed that he is using in his function *“indicators like return rate and quality measures like failure rate per thousand parts.”* Concerning the development of indicators in the area employees, some interviewees pointed to a newly introduced qualification matrix for employees. This matrix should track development and learning concerning the workforce so that the strategic objective of having *“qualified and motivated employees”* is fostered and supported. Consequently, some ideas for all strategic areas have been expressed towards the set of specific indicators. Almost all interviewees agreed that the measures must be aligned with strategic goals and support business improvements as well as the new structure of the organization.

When it comes to the requirements for the set of indicators, the interviewees mentioned several different adjectives to describe the measurement system. That the indicators are supporting the understanding of employees for the performance measurement and the acceptance of the workforce for the indicators in general was of high importance for the interviewees. That means that the indicators should be simple and easy traceable. Furthermore, some division managers claimed that transparency and the connection to other indicators has to be clearly stated and visible. In addition, one member of the Executive Department of BPM stated that the set of indicators should support decision making on all managerial levels and help continuous monitoring and planning. Moreover, he mentioned that indicators should be useable and reliable, so that employees can actively work according the measured performance. Nevertheless, another member of the Executive Department of

BPM added: *“For top level decision making we need a fixed set of indicators to take decisions. On lower levels, however, the indicators should be flexible since the processes are ever changing.”* That means the higher the managerial level, the more static should be the set of indicators to make it reliable and in line with strategic objectives. One division manager also expressed the importance of trend analysis to be able to compare over time and base decisions on developments in the performance.

#### 4.3.1 Challenges Concerning the Performance Measurement System

The interviewees identified and mentioned several challenges the company is facing throughout the development and identification of indicators in the PMS. Most of them realized that various difficulties occur when setting indicators concerning process orientation and indicators on several managerial levels. Yet, some interviewees have recognized that for the organization the integration of process orientation and indicators is a new topic. Consequently, there is experience missing, so that it will be an ongoing process in which trial and error or rather learning by doing is necessary. One member of the Execution Board of BPM acknowledged: *“Employees have to learn to live and work actively with KPIs.”* He claimed that for some employees that would mean an immense effort due to the radical change. Before, only a few managers worked actively with KPIs and based decisions on it in a centralized structure. He added that now more employees on lower managerial levels will be encouraged to actively use performance indicators. Beyond, there is agreement that it is extremely challenging to set the right amount of measures. Some division managers state that there are areas with too many indicators and in other areas there are not enough performance indicators. This is confirmed by a division manager who said: *“I think some departments use 4 measures, others use maybe 100 and others might even use 1000 performance indicators.”* Further, division managers expressed that at the moment there is a strong focus on financial measures in all areas of measurement. Employees are pointing to the fact that the entire business currently does not yet have a structured process for cooperative development for indicators, so that they have identified challenges regarding the achievement for indicator value. The CFO claimed that this is caused by the introduction of the process orientation and matrix structure, fields of tension between purposes may occur. He added: *“These tensions in the objectives are arising between quality, costs and time. Especially in the area of product development and innovation, these tensions are recognizable.”* This is supported by a member of the Execution Department of BPM who saw the need to find the right balance between quality and time. However, most of the employees are aware that the development of a performance measurement system with regards to process orientation is extremely difficult to realize. Due to the still missing structure, indicators do not yet describe clearly the relation and link towards some processes, so that in some areas of the company improvement is necessary. That can also be seen in the set itself. One interviewee from the execution department stated that company’s

indicators are focusing mainly on output and do not consider the process performance. That means the actual efficiency and effectiveness of some processes is not measured. This has to be adjusted and will be realized in several projects as part of the strategic roadmap.

Additionally, interviewees see challenges concerning the new introduced matrix organization in relation to a PMS. As mentioned in the BPM process, also here it is said that the change process needs time and requires a lot of effort. The communication towards employees is seen as problematic by division managers. Consequently, missing transparency and communication from top-down towards employees on operational level can lead to coordination problems and difficulties in clarifying responsibilities. Next to this, two interviewees mentioned that the execution of a coherent PMS needs IT integration and support, which is currently not in place.

#### 4.3.2 Solutions to the Challenges

Facing the above-mentioned challenges, the employees stated several possible solutions to tackle the problems caused by the change and implementation of the organizational structure and the development of performance indicators. Especially the management on a higher hierarchical level have been aware that the change of culture and the development of suitable indicators on different levels need time and persistency. Most interviewees stated that management should demonstrate leadership and set an example when it comes to living and working actively with KPIs. The Head of HR said: *“This would show the employees that we can really actively achieve a change.”*

Most of the interviewees see that an increase of communication throughout all managerial levels is necessary. An example by the Head of HR entailed the of meetings to clarify problems and challenges. The CFO is convinced that through the constant project work and involvement of different employees from various departments, the change will be well communicated. Furthermore, most employees see that cooperation, also on cross-functional basis, is one of the keys for success. To foster cooperation and collaboration, departments and responsible people should be able to compromise in order to figure out responsibilities in interfaces. Moreover, the interviewees identified the exact same challenges concerning responsibility and accountability as mentioned in BPM. As solutions, such as increased communication and clear guidelines for standardized work procedures, were proposed. A division manager added: *“It should be stated how conflicts and challenges should be solved and who is responsible on the next higher managerial level.”* The clear allocation should help to increase efficiency in decision-making. Additionally, interviewees identified these standards would be key to ensure the alignment of indicators towards the objective on tactical and strategic level. It was mentioned by several interviewees, that this might also help to integrate dependencies of indicators in processes and find factors of involvement of indicators. This counts also for the

definition of targets within the measurement system. In a collaborative manner between division managers and the next higher managerial level should formulate KPIs to secure target alignments. Besides these possible solutions, two interviewees stated that increased transparency is necessary. They proposed that this can be achieved through an integrated IT system supporting actively performance measurement. Next to that, one division manager suggested to implement a process portal (e.g. presented in a new developed Intranet) in which processes are accessible for all employees to foster understanding and acceptance around the workforce and transparency.

#### 4.3.3 The Use of Performance Indicators and Associated Challenges

Company X uses performance indicators on different hierarchical levels. Hereby, top management emphasized that the use on strategic level is clearly structured and fixed in a monthly report with different indicators from different levels. However, depending on the level of management, the depth of indicators used can change. Consequently, Company X uses different indicators within their management, core and supporting processes. According to the CFO, the use of leading indicators (e.g. receipt of order) as well as lagging indicators (e.g. gross margin) are implemented on all different process levels.

Due to the implementation of the matrix organizational structure and process orientation, challenges also occurred in the management and usage of performance indicators. Users of the indicators and process indicators are process owners, line managers and the managing board. Especially, concerning the use on operational level, there were significant challenges noticeable. Division managers claimed that tensions arise with regards to responsibility and clear accountabilities. On division manager said: "Sometimes it is not 100% clear, why and how we use the measures. Sometimes I don't even know why we take the measure." The CFO stated that through the matrix "different purposes can arise, since there is always the tension between quality, costs and time." Nonetheless, he added that in case of conflict of goals, top management should decide regarding the strategic objectives. As mentioned above, a challenge concerning accountabilities and responsibilities concerning the management of performance indicators was mentioned as one of the key challenges within the whole organization. Furthermore, some interviewees stated that the direct link and contribution of performance indicators to the achievement of the overall target or incentives seems to be sometimes unclear. This cause-effect relationship and the clear connection is perceived as a problematic topic. However, according to one division manager most linkages are based on diagnostic controls and measures. This can be confirmed with the observation of the manufacturing process in which time and costs are the essential drivers and thus directly connected to the overall performance. Solutions provided by division managers are the active integration of employees in the definition and usage of indicators. The open communication about the purpose and use of indicators should be clarified. The interviewed members of the

Executive Department of BPM stated that they see communication as a driver of change also in the use of performance indicators. One member of the Execution Department of BPM stated: *“It is important to clarify the use of this measurements in front of the employees and make clear that they will also benefit from it. We do not want to control them, but help them to manage their work better.”* Additionally, one division manager claimed that indicators should be more linked to motivation. Hereby, the Head of HR mentioned that he is convinced that motivation is directly linked to performance improvements.

#### 4.4 Summary of Empirical Findings

The aim is to answer the question on how an organization changes to a business process management with regards to types of challenges and management for the set and use of performance indicators. To answer this question, the main results from the empirical findings can be summarized as follows:

Currently, Company X is conducting a change in the organizational structure towards process orientation based on a strategic reorganization. In connection to that the company is adjusting their performance measurement and management system in order to support the new organizational direction. This development is necessary due to several reasons, which can be found in the areas of increased organizational complexity caused by organizational growth, reallocation of responsibilities and collaboration between departments, and a merger as chance to take plans into action.

The implementation of the process orientation and restructuring of the business has been done in several steps. First, the company defined strategic goals within four areas (i.e. customer, employees, growth, efficiency). Based on this, a roadmap was developed entailing milestones and strategic initiatives with focus eight focus areas. These areas have been defined on a cross-functional basis and have not been pointing towards specific functions or divisions. To comply with strategic goals, the company has developed a strategic matrix in which goal corridors, major/strategic indicators and targets as preparation for the set and use of possible KPIs on all managerial levels have been developed. These corridors are aiming to support the derivation of goals for each function and process. The next step in this development has been and still is the identification and documentation of process types, steps, cost and capacity drivers and the definition of process owners. Performance indicators and processes in this sense are developed in a top-down approach in collaboration with the second line of management. First, indicators are defined on strategic level, then are derived on tactical level and finally created on the operational level in line with the higher managerial levels. For processes, they are called management processes, core processes and supporting processes. On the operational level, division managers and defined process owners derive processes and use the divisional expertise for the creation of coherent processes and indicators. The purpose of this

approach is to implement a matrix structure on the operational level for where indicators and processes will be implemented and support the higher-level managers and decision-making.

During the development and implementation of the business process management and a coherent performance measurement system, the company identified several challenges ranging from general implications to specific areas in the set and use of indicators. The categories can be summarized in company/technical and people related challenges and are presented in Table 6 below. In each specific area, challenges occur but apparently, there are overlapping problems, which concerns business process management and the set and use of indicators.

*Table 6 - Categorized Experienced Challenges from Company X*

<b>Company/technical related challenges</b>	<b>People related challenges</b>
Definition and development of the right amount of measures	General lack of experience in the set and use of process performance indicators
Definition and tracing of connections and interrelations of indicators	“Live” with the indicators on all managerial levels
IT support for the measurement and reporting of performance indicators	Understanding of the use and measure of indicators and related procedures
Alignment of processes and indicators towards strategic goals throughout the entire organization	General change process within the organization and for the employees: Shift from organizational silo thinking
Standardization of common procedures and processes	Acceptance and involvement of employees in the set and use of indicators
Correct documentation and storage of KPIs and processes	Lack in communication between horizontal and vertical functions
Allocation of responsibilities and accountabilities for performance measurement and management	Allocation of responsibilities and accountabilities for performance measure management
Equal focus on all four strategic goals	Tension between different purposes within the processes

## 5. Analysis and Discussion

*In the following chapter, the empirical findings are analyzed by applying the theoretical aspects to find reasons behind the experienced challenges of Company X. Accordingly, this chapter is subdivided into company/ technical related challenges and people related challenges. At the end, the results of the analysis are summarized and discussed.*

### 5.1 Company/ Technical Related Challenges

On the one side, the company is facing challenges from a rather technical perspective during the implementation of the desired change. It can be noted that challenges can be interrelated with each other, but as well can have implications on people related challenges. We are also of the opinion that technical difficulties and challenges can be influenced by people related factors. However, in general, most of the identified challenges in the empirical findings are congruent with challenges that are described in existing theories and previous empirical studies.

When looking at the strategic areas of the company, it is clear that four aspects are defined (i.e. customer, employee, growth and efficiency). Yet, interviewees have expressed that the equal focus on all four strategic goals is an immense challenge. This strategic concept has similarities to a Balanced Scorecard (Kaplan et al., 1992) and consists of equivalents to the areas financial perspective, customer perspective, internal perspective, and learning and growth. Currently, the company does not have a balanced view on all four perspectives. In documentation and in the matrix to define the strategic corridors, the company explicitly treats all areas equally. Nevertheless, when it comes to the set and use of performance indicators in daily work, there is extensive weight on financial indicators, which are used for decision-making and justification for results. Strategic goals are derived for all areas, but only for the areas efficiency and growth, targets are clearly defined, whereas targets for employees and customers stay rather on a vague level. This unbalanced view can be explained with the change process the company is currently undertaking. Before, in a centralized structure, the focus lied on indicators concerning output and financial data. This radical change in the organizational structure has also consequences for the use and set of indicators in the areas such as learning, actively working with indicators and general change of working routine.

Further, in the company there seems to be a lack of clarification about the cause-effect relationship of indicators and targets. This fact intensifies the mentioned unbalance, since clear connections towards the goals and the strategic achievements are missing. When connections are present, they are based on diagnostic controls and measures. Especially, the impact, complementary or even conflicting relations of indicators (Ittner et al., 2003) in the areas employees and customers towards the overall strategic goals are not yet clarified. Hence, an alignment of process indicators on all levels is difficult. Han et

al. (2007) see a comprehension of the cause-effect relationships as a prerequisite and a dependent factor for the effective and efficient use of indicators to monitor company's performance. When looking at the unbalance between the goals, the range of impact has to be considered. Growth and efficiency tend to have a direct impact on the company's results, whereas employee and customer have a rather long-term on results. Hence, investments and performance improvements do not have direct impact and are not instantly feasible, but may have a high influence on the organization's long-term survival. Consequently, the understanding of cause-effect relationships needs to be learnt and experienced, which is tied with people related challenges. Based on this, processes and indicators on certain levels are lacking connections and correlations, so that it could end in wrong and inefficient measurement and consequently to poor performance evaluation. This can be seen as a prerequisite for performance management and other improvements in the short- and long-run.

In connection to that, some interviewees identified an unbalance in the current amount of indicators. It was stated earlier that some departments "*might even use 1000 performance indicators.*" Finding the right number of indicators seems to be a problematic topic. This is confirmed by Wieland et al. (2015) who see the right amount of measures as one critical success factor. Measuring too extensively might give the illusion of control, since the set of indicators could fail to address the purpose in the process (Gray et al., 2015). Yet, measuring too less can also distort and influence decisions and declining performance (Wieland et al., 2015). Due to this unbalance, the company may fail to understand and see the impact of certain areas. This is caused by a wrong focus or by having the illusion to evaluate relations differently than they actually are supposed to be related. In here, it is important to find the right balance (Wieland et al., 2015) and concentrate on the purpose in the process, which is supported by the indicators. Failing to meet the purpose with wrong measures can harm the entire system and could create enormous costs for the company (Gray et al., 2015). Problematic can be to balance the tension between quality, time and costs, since they are the main drivers in process orientation regarding organizational goals (Tupa, 2010). This tension currently occurs mainly due to the not yet fully developed process landscape. However, the implementation of all possible indicators with the given purpose depends on the maturity of existing processes.

Another technical challenge can have a high impact on previously mentioned challenges. Due to the increase of complexity, the company feels the need to standardize and structure processes. This also includes the standardization of how indicators and targets are derived and set within the comprehensive measurement system for the process orientation. This requires a detailed documentation of processes and indicators to implement a coherent reporting system, which further enhances transparency. The issue of transparency and reporting should be covered with a comprehensive and integrated IT support and the tool to publish process documentation with related effective and efficiency measurements (i.e. employee resource planning). As mentioned by one



member of the Executive Department of BPM the intention is to “*structure, standardize and guide chaos.*” That means that organized chaos is seen as essential, since flexibility and responsiveness are prerequisites for the long-term survival of the company (Sanchez-Ruiz et al., 2016). In general, the key is to find the right balance between standardization and flexibility in order to allow chaos to respond to market changes. Yet, the higher the managerial level, the more static is the reporting structure of performance indicators to take this as one factor (next to other factors) for strategic decisions on trend analysis and evaluations. With the more static approach on higher managerial levels, the company wants to ensure alignment of the business processes and process indicators. Employees are aware of the fact that shortcomings in strategic alignment can harm long-term success of the implementation. This corresponds to previous research by Neubauer (2009), Hernaus et al. (2012) and Silva et al. (2012). The renunciation of flexibility in highest strategic level can be traced back to previous existing structures in which information was gathered centrally and decisions were delegated downwards. Although, the organization intends to implement a matrix structure, all major decisions are made through a central institution. We believe that this change has to be considered and solved on a people related basis concerning leadership and collaborative solution finding. Nonetheless, alignment of indicators and processes are difficult to achieve, since the company is in need to find the right balance between standardization and controlled chaos, the right amount of measures, and the focus of all strategic areas.

## 5.2 People Related Challenges

On the other side, associated with the implementation of process orientation and the business process management, Company X faces several challenges within the set and use of performance indicators that are rather related to people.

The intended matrix structure raises questions concerning the allocation of responsibilities and accountabilities on operational level. Especially in the starting phase of the introduction, tension may occur between the newly assigned process owners and the designated functional managers. This is corresponding to the observations of Chenhall (2008) and Damji et al. (2014). Through this structure, employees from both sides are forced to work collaboratively together to find solutions and make decisions. As a consequence, managerial activities are supposed to increase due to the rise of coordination within the matrix structure, as observed by Silva et al. (2012). In order to successfully conduct cross-functional collaboration, the company has to overcome functional thinking and enhance a change in the mindset. This change process is supposed to be taken step by step and will take time to be implemented, as several interviewees have realized. Thinking and living the process orientation is one of the key success factors in this area. Through the banning of “silo thinking” and the integration of an anticipated “solution-driven” culture, we believe that employees will benefit from it in several

ways. Firstly, the complexity and amount of managerial activities will be decreased, when communication flows horizontally and vertically in two ways. Secondly, well allocated responsibilities and accountabilities with clear guidelines for the solution finding might increase efficiency and effectiveness in daily work. However, we are of the opinion that this change of mindset needs support and has to be fostered by top management who should act as role models when it comes to the realization of process orientation. Damji et al. (2014) suggested that top management should take responsibility in this case. “Thinking” and “Living” according the process orientation is seen as a prerequisite to successfully conduct the change of mindset within the entire workforce. As the CFO stated, the company is aware that this radical change brings uncertainties and worries among the employees, who naturally show traces of resistance to change their working routines and habits.

Kueng (2000) stated that process performance thinking is essential for process actors. In order to achieve that, we believe that leadership is required to convince the workforce and communicate the strategic direction of the company. Management involvement and knowledge for the analysis, design, implementation and optimization of business process management is considered to be necessary (Neubauer, 2009; Silva et al., 2012). Moreover, this process thinking and living expands further to the use of indicators. As Company X stated, the performance indicators should not just be developed and implemented to measure something without purpose or just because it is nice to have. They should be actively used as support to take decisions. Sahoo et al. (2012) indicated that if the employees understand the performance measurement system and the entailing measures, it could lead to overall performance improvements. This emphasizes that living with indicators, meaning the active usage to support decision making, depends on the understanding of the measures. Accordingly, Wieland et al. (2015) and del-Río-Ortega et al. (2016) saw comprehensibility and clarity of indicators as part of the quality criteria for indicators. We believe that the understanding of indicators and the realization to work actively with indicators can be fostered when employees are actively involved in the definition, use and set of indicators. This can be evidenced in Company X in which some division managers define and implement their performance indicators (on operational level) for the processes together with subordinates. Some employees have observed that managers, who had been involved in the development and implementation, are actively using these indicators and consider them for decision making. Therefore, participation and involvement can have a positive impact on the acceptance and habit how employees live and consider performance indicators. Yet, there are still problematic functional areas in which the active use is lacking behind due to the top-down approach. Some managers claimed that there is a lack of understanding of why and how some measures are used. This is caused by misleading or wrong communication. Either the approach and the derivation was not clear communicated or the KPI was developed by an employee who is not actively involved in the usage of the indicator. We argue that in the implementation the set and use of indicators are linked together and should not be untied. This implies that the derivation of indicators in a top-down

approach can limit the comprehensibility of indicators and harm the usage on operational level. Therefore, we argue that the lack to actively work and “live” concerning indicators can be traced back to the way how they have been defined. Additionally, the amount of indicators, which has been explained in the technical side, has further influences on this topic.

Acceptance of employees for the change and the implementation of BPM as well as specific indicators is identified to be challenging. According to Wieland et al. (2015) the acceptance is another requirement leading to better understanding and usage. Moreover, resistance to change or usage of indicators can occur due to the missing participation and involvement. Company X has experienced resistance with regards to the introduction of business process management. We are convinced that the reason behind the challenges can be found in the top-down development and implementation of certain indicators. Employees have not been actively involved yet and therefore lack understanding and knowledge. Though, Company X has realized that resistance is the major driver behind the challenge of acceptance. A proposed solution entailed to foster communication on all levels and involve management. This communication, however, has been poorly executed until now which we noted during the conduction of interviews, since interviewees have not shown congruence in the definition of objectives for the new business process management. The responses differed and have not been all congruent towards the four strategic goals. We presume that the lack of communication influences the set and use of indicators since it seems unclear for participants to see clear relations of their indicators contributing towards the company’s goals. As a consequence, there seems to be a lack of awareness of cause-effect relationships between functions, processes and strategic goals. Corresponding to that is the theory from Ittner et al. (2003). This indicates that awareness can be also related to understanding of measures and their links.

Lastly, Company X stated that they have little experience with the development, implementation, usage of process specific indicators. By including an external consultancy company in the initial phase of the implementation, the company made sure to have a clear guidance for the start due to a lack of experience in this area. In the case of the derivation and development of specific process indicators, del-Río-Ortega et al. (2013) explained two different methods entailing a bottom-up and a top-down approach. In order to develop comprehensive indicators, collaboration and cooperation is necessary. To further develop the process orientation and the supporting measurement system, the company realized that it is an ongoing process, which encompasses trial and error as well as learning by doing. This ensures active participation and collaborative work on cross-functional basis. Inexperience is depending on the time and the maturity of the entire process of implementation. Neubauer (2009) stated that most of the companies in his study were still in the implementation phase. Consequently, we suppose that through the active involvement, collaboration and information sharing over time experience increases.

Concluding the experienced challenges within the implementation of a business process management with regard to performance indicators from the people perspective at Company X, it can be noted that challenges are interrelated and point towards understanding and involvement. The reasons behind the challenges can be categorized in communication, leadership, experience and mindset. In these four categories, challenges are correlated and can be solved by enhancing and focusing on these attitudes. This seems logical since people are more likely to work towards a goal when they understand the goal. The achievement of the common goal can be facilitated by focusing on participation, understanding and the mentality of employees. We argue that the anticipated way of Company X to focus on communication and involvement is a way to tackle the challenges at hand. In the organizational context, it is upon leadership to create this culture of communication and involvement in the set and use of indicators.

### 5.3 Summary of Analysis and Discussion

As shown above, during the implementation of a business process management system and the associated performance measurement system Company X faces several challenges. These challenges can be divided into company/technical and people related ones. First, our analysis shows clearly that the type of challenges are interrelated and influence each other making the identification of the reasons behind the challenges more complicated. Further, the analysis indicates that that people related factors give company/ technical related challenges the context. Accordingly, the reasons of the experienced challenges on the people side point towards lack of leadership, communication and lack of experience, which also influences company/technical challenges. Beyond these reasons, the overall decision to implement business process management can be seen as cause of the experienced challenges on the company/technical side. For the company, there is the difficulty to align processes and indicators with the organization's objectives. The struggle lies especially in finding the right tension between standardization and controlled chaos on operational level, defining the right number of indicators, and balance the focus on all strategic areas with different effects in the long- and short-run.

The research area combining business process management and performance measurement and management, is a rather new topic and does not provide a huge variety of empirical data and depth in research. Both big research areas, although BPM is also a rather new topic, are well researched and provide different aspects and views. Nevertheless, we have detected several gaps within research on several levels which have not been researched either to complete a bigger picture or to support the understanding of the specific usage and consequences of the development and implementation of such a management technique for an organization.

The implementation of process orientation and a supporting PMS raises questions on several levels and areas. On the one hand, organizations face challenges related to technical issues, e.g. the alignment of processes and performance indicators. On the other hand, the change requires a great effort of employees and managerial staff. It becomes obvious that in the development and integration of a coherent and comprehensive system or structure several different factors play significant roles, which are not directly visible in the first place. Contextual factors, such as organizational culture, employees' values and mindset have a high impact and are main drivers if the implementation is in the end successful or will fail.

The existing empirical data is rather fragmented in these research areas. There is literature that is taking a technical approach for the comprehensive implementation of BPM and PMS. Steps how to change, what to change and why to change regarding process and performance management are clearly explained by several researchers, as shown by Nadarajah et al. (2014). Guidelines, e.g. the PMS framework of Ferreira et al. (2009), may provide a step-by-step guidance and describe challenges. People-related challenges, e.g. resistance to change or lack of acceptance, are not well identified and explained, especially when it comes to research concerning the implementation of PMS. It is mentioned that there may occur coordination problems (Damij et al., 2014). Nevertheless, these challenges are neither further defined and specified nor possible solutions are provided. The focus on change of culture and structure in organizations is approached by a technical aspect. Research concerning the behavioral and human aspects, such as learning, knowledge and change in behavior, is not directly connected to this area of implementation for PMS. For BPM, some of these aspects are mentioned by researchers, such as Chenhall (2008), Neubauer (2009), Silva et al. (2012), and Damij et al. (2014), but might be oversimplified or the impact is underestimated. It raises several questions concerning the effects of the implementation on managerial level and how to respond to these challenges. However, some challenges are addressed and possible ways for solutions are given, but usually researchers focus on a specific problem either related to processes, performance, projects, or implementation. In general, one framework responding on challenges on several areas and levels is not provided.

## 6. Conclusion

*In the following chapter, the answers to the research question are shortly concluded. Accordingly, theoretical and practical implications are derived, including a critic to this study. The chapter ends with a suggestion for further research topics.*

### 6.1 Outcome

This study aims to examine types of challenges in existing theories and previous empirical studies concerning the implementation of BPM with regards to the set and use of performance indicators. Moreover, the case study of Company X is used to get, on the one hand, an insight of how a company implements the business process management methodology in general and, on the other hand, what challenges occur during the implementation of performance indicators. Lastly, we want to know why organizations face challenges during the implementation of BPM and the entailing performance measurement system.

The first question is answered through the examination of different theoretical perspectives in the field of implementation of BPM, PMS and performance indicators. Accordingly, the study shows that there are two types of challenges in the BPM literature, namely company/technical and people related challenges. We are convinced that due to the fact that performance indicators and PMS are subordinate to BPM, the categorization into these two types is applicable for PMS and PIs. It is noticed that on BPM level, the amount of challenges on both sides are equal, whereas the literature concerning implementation of PMS and indicators concentrates on company/technical issues and does not balance it with people related challenges.

Secondly, we want to know how Company X implemented their BPM with regards to the set and use of performance indicators and also what challenges they experienced during the implementation. The implementation approach can be described as a top-down development and implementation by starting with the definition of strategic goals with the support of an external consulting firm. From there, processes and indicators are derived and broken down towards the operational level. Within this implementation, Company X faced several challenges on company/technical side as well as on people side.

Lastly, we try to find reasons why Company X faced challenges at their performance measurement system within the implementation of a business process management. The results indicate that company/technical and people related challenges are interrelated and influence each other. Due to the interrelation and influence, it is difficult to clearly define the reasons behind the challenges. Nonetheless, we believe that the causes of challenges on company/technical can be found in the

struggle to align processes and indicators, define standardization and chaos, and balance tension between all defined strategic areas. On people side, major challenges are caused by a lack of leadership, communication and experience.

Concluding, this study highlights types of challenges, namely company/technical and people related, within the implementation of BPM with regard to the set and use of indicators. Along with the answers to the research questions, this study calls for less fragmentation and simplification in literature regarding implementation challenges of performance measurement systems within the BPM methodology.

### 6.1.1 Theoretical Contributions

This case study contributes significantly to the existing theory and empirical findings. Existing theory as well as empirical studies in the field of a BPM implementation regarding the set and use of performance indicators points mostly towards company/technical related challenges. Although in the implementation of the BPM methodology, challenges are clearly divided into the two categories, literature for implementation of performance management and performance indicators lacks this categorization. Nonetheless, most of the challenges in the literature can be classified as company/technical related challenges. The case study of Company X implies that in the implementation of a PMS within BPM, both types of challenges can occur. Hereby, the people related are one of the factors that can cause company/technical ones. Consequently, we contribute by pointing towards the fragmentation of literature and further provide a more comprehensive picture of challenges.

In addition, the empirical results for the implementation of a business process management correspond to existing empirical studies in this field. Therefore, our findings strengthen the results of these studies and further validate the process for the implementation of the business process management methodology. Beyond, challenges associated with the company/technical side correspond to the literature. Therefore, it indicates that these challenges can be seen as critical areas during the implementation of a BPM with regards to the set and use of performance indicators. Accordingly, the findings of this thesis confirm existing theory and previous empirical studies.

Lastly, the results of this thesis contribute to theory by implying that the reasons behind most of the challenges during the implementation of BPM and PMS are mostly related to people. The challenges experienced at Company X as well as their solution strategies for these challenges already pointed towards a more people related solution approach. Hence, we found evidence that causes for company/technical related challenges can be found on the people side. Therefore, we presume that challenges are caused by a lack of leadership, lack of communication and lack of experience.

### 6.1.2 Practical Contributions

The findings of this thesis also raise important topics for practitioners. First of all, we provide a comprehensive view on categorized challenges examined in literature as well as Company X. We think that this can give practitioners an idea about challenges that can occur during the implementation of a BPM regarding the set and use of performance indicators. Even though, some challenges are unique, on a more general level the type of challenges are universal applicable. Therefore, our empirical data as well as theoretical perspectives contribute to practitioners.

Additionally, we are convinced that the identified causes, in both categories, for the experienced challenges of Company X can provide practitioners insights on topics to anticipate critical topics for their implementation of BPM. We believe that the causes can be generalized. In fact, one cause can lead to several effects and is mostly not tied to specific conditions. Therefore, causes can be seen as universal applicable. In conclusion, the presented causes in this thesis can be used to enhance manager's understanding for critical areas during the implementation of BPM, entailing PMS and performance indicators.

### 6.2 Criticism to the Study

This study investigates the challenges within the set and use of performance indicators under the special circumstance of the implementation of a business process management. As presented, the implementation of this methodology at Company X is a long-lasting procedure. Nevertheless, this thesis merely looked at a small-time frame of the entire implementation process. We assume that this small extract of the complete implementation could have led to distortion in the data. This cause might decrease the validity and reliability of the results.

Moreover, we question the amount of theoretical perspectives applied in this thesis. The considered perspectives of performance measurement with regards to implementation of business process management could have limited our view on company/technical and people related challenges. We believe that behavioral science topics should have been examined in our theoretical perspectives to complete a more comprehensive picture in the analysis. To conclude, we presume that this would have strengthened the results of this thesis.

Lastly, we believe that the reasons provided to the challenges examined in this thesis can be questioned. Accordingly, other factors such as cultural influences, the general mind set within this culture as well as other external influences/contextual factors can contribute to the occurrence of challenges within the implementation of BPM and a comprehensive PMS. Moreover, as stated, a clear



link to single causes of challenges is not possible, therefore our results to research question 3 can be questioned.

### 6.3 Future Research Fields

This case study contributes to the fields of business process management and performance measurement by connecting these areas in an organizational context. Nevertheless, various questions remain unsettled within these fields. In order to test or confirm the result of this study, more case studies, especially with a longitudinal approach, are necessary to clarify interrelations of types of challenges and contribute to problem solving for the implementation. This would probably strengthen the given case study. Further, a continued case study on the same manufacturing company would be of interest to comprehend the process of implementation, the tension between sources of problems and areas of strategic focus. The results of this study call for more studies based on a reflection of people related challenges. A deeper understanding and a more comprehensive picture of the reasons are necessary. These studies with focus on similar companies in this industry sector would enhance the validity and reliability of our case study and would create a benchmark to see differences in management styles and contextual factors.

The existing literature, which is rather fragmented and tends to oversimplify implementation challenges, is calling for an integration of all types of challenges. That means that a combination of technical challenges (covered in existing implementation guidelines) and behavioral challenges (tend to be left out in implementation guidelines especially in PMS literature) into a comprehensive handbook would be reasonable. This could be a groundwork to further develop room for previously ignored study fields.

## 7. References

- Ali, H. and Birley, S., 1999. Integrating deductive and inductive approaches in a study of new ventures and customer perceived risk. *Qualitative Market Research: An International Journal*, Vol. 2, pp. 103 - 110.
- Beretta, S., 2002. Unleashing the integration potential of ERP systems – The role of process-based performance measurement systems. *Business Process Management Journal*, Vol. 8, pp. 254 – 277.
- Bititci, U. S., Carrie, A. S. and McDevitt, L., 1997. Integrated performance management systems: a development guide. *International Journal of Operations & Production Management*, Vol. 17, pp. 522 - 534.
- Bontis, N. and Nikitopoulos, D., 2001. Thought leadership on intellectual capital. *Journal of Intellectual Capital*, Vol. 12, pp. 183 - 191.
- Bosilj-Vuksic, V., Milanovic, L., Skrinjar, R. and Indihar-Stemberger, M., 2008. Organizational Performance Measures for Business Process Management: a Performance Measurement Guideline. *IEEE Computer Society: Tenth International Conference on Computer Modeling and Simulation Paper*, pp. 94 - 99.
- BPM&O and BearingPoint, 2015. Mit Business Process Management (BPM) fit für die digitale Zukunft, Available at: [http://www.bpmo.de/bpmo/opencms/de/img/BEDE15\\_0989\\_BPM\\_Infografik\\_final.jpeg](http://www.bpmo.de/bpmo/opencms/de/img/BEDE15_0989_BPM_Infografik_final.jpeg) [Accessed on 21 Apr 2017].
- Bryman, A. and Bell, E., 2011. *Business Research Methods*. (3rd ed.). Oxford University Press, New York.
- Burattin, A., 2013. Applicability of Process Mining Techniques in Business Environments. Ph.D. Università di Bologna, Alma Mater Studiorum, Bologna.
- Chan, F. T. S., and Qi, H. J., 2003. Feasibility of performance measurement system for supply chain: A process-based approach and measures. *Integrated Manufacturing Systems*, Vol. 14, pp. 179 – 190.
- Chenhall, R. H., 2008. Accounting for the horizontal organization: A review essay. *Accounting, Organizations and Society*, Vol. 33, pp. 517 - 550.
- Cleven, A., Winter, R. and Wortmann, F., 2012. Process performance measurement – a systematic problem analysis and identification of design principles. *International Journal of Organisational Design and Engineering*, Vol. 2, pp. 227 - 249.
- Company X, 2016. Process orientation and performance indicators. Workshop presentation material [Internal document].
- Damij, N. and Damij, T., 2014. *Process Management - A Multi-disciplinary Guide to Theory, Modeling, and Methodology*. Springer Verlag, Heidelberg.
- del-Río-Ortega, A., Resinas, M., Cabanillas, C. and Ruiz-Cortéz, A., 2013. On the definition and time-analysis of process performance indicators. *Information Systems*, Vol. 38, pp. 470 - 490.
- del-Río-Ortega, A., Resinas, M., Durán, A. and Ruiz-Cortés, A., 2016. Using templates and linguistic patterns to define process performance indicators. *Enterprise Information Systems*, Vol. 10, pp. 159 - 192.
- Deming Prize Committee, 2014. Introduction of the Deming Prize, Available at: [http://www.juse.or.jp/deming\\_en/data/02\\_Introduction\\_DemingPrize2014.pdf](http://www.juse.or.jp/deming_en/data/02_Introduction_DemingPrize2014.pdf) [Accessed on 30 Mar 2017].
- Domanović, V., Jakšić, M. and Mimović, P., 2014. Balanced Scorecard and Analytic Network Process in Performance Measurement and Strategy Evaluation: A Case Study. *Teme - Časopis za Društvene Nauke* 4, pp. 1457 - 1474.

- Elzinga, D. J., Horak, T., Lee, C-Y. and Bruner, C., 1995. Business Process Management: Survey and Methodology. *IEEE Transactions on Engineering Management*, Vol. 42, pp. 119 - 128.
- Ferreira, A. and Otley, D., 2009. The design and use of performance management systems: An extended framework for analysis, *Management Accounting Research*. Vol. 20. pp. 263 - 282.
- Folino, F., Guarascio, M. and Pontieri, L., 2015. A Prediction Framework for Proactively Monitoring Aggregate Process-Performance Indicators. *IEEE 19th International Enterprise Distributed Object Computing Conference*, pp. 128 - 133.
- Garvin, D. A., 1998. The Process of Organization and Management, *Sloan Management Review*, Vol. 39, pp. 33 - 50.
- Glavan, L. M., 2011. Understanding Process Performance Measurement Systems. *Business Systems Research*, Vol. 2, pp. 1 - 56.
- Gray, D., Micheli, P. and Pavlov, A., 2015. Measurement Madness: Recognizing and avoiding the pitfalls of performance measurement. John Wiley & Sons Ltd., United Kingdom.
- Hammer, M. and Champy, J., 1993. Reengineering the Corporation: A Manifesto for Business Revolution, Harper Business, New York.
- Han, K. H. and Kang, J. G., 2007. A process-based performance measurement framework for continuous process improvement, *International Journal of Industrial Engineering*, Vol. 14, pp. 220 - 228.
- Han, K. H., Kang, J. G. and Song, M., 2009. Two-stage process analysis using the process-based performance measurement framework and business process simulation. *Expert Systems with Applications*, Vol. 36, pp. 7080 - 7086.
- Harmon, P., 2014. Business process change: a business process management guide for managers and process professionals. (3rd ed.). Elsevier Inc., Massachusetts.
- Hellström, A. and Eriksson, H., 2008. Are you viewing, mapping or managing your processes?, *The TQM Journal*, Vol. 20, pp. 166 - 174.
- Hernaus, T., Bach, M. P. and Vukisc, V. B., 2012. Influence of Strategic Approach to BPM on financial and non-financial performance. *Baltic Journal of Management*, Vol. 7, pp. 376 - 396. *Intellectual Capital*, Vol. 12, pp. 183 - 191.
- Ittner, C. D. and Larcker, D. F., 2003. Coming Up Short on Nonfinancial Performance Measurement. *Harvard Business Review*. Vol. 82, pp. 88 - 95.
- Ittner, C. D. and Larcker, D. F., 2001. Assessing empirical research in managerial accounting: a value-based management perspective. *Journal of Accounting and Economics*. Vol. 32, pp. 349 - 410.
- Johnson, S., 2004. Management Control - A Pre-Requisite for Survival, Available at: <http://www.accaglobal.com/uk/en/student/exam-support-resources/professional-exams-study-resources/p5/technical-articles/management-control.html> [Accessed on 22 May 2017].
- Kaplan, R. S., 1984. The evolution of management accounting. *The Accounting Review*. Vol. 3, pp. 390 - 419.
- Kaplan, R.S. and Norton, D.P., 1992. The Balanced Scorecard - Measures That Drive Performance. *Harvard Business Review*. January-February, pp. 71 - 79.
- Kohlbacher, M. and Gruenwald, S., 2011. Process orientation: conceptualization and measurement. *Business Process Management Journal*. Vol. 17, pp. 267 - 283.
- Kueng, P. and Krahn, A. J. W., 1999. Building a Process Performance Measurement System: Some Early Experiences. *Journal of Scientific & Industrial Research*, Vol 58, pp. 149 - 159.
- Kueng, P., 2000. Process performance measurement system: a tool to support process-based organizations, *Total Quality Management*, Vol. 11, pp. 67 - 85.

- Larsson, R. G., 2016. Performance measurement & management, BUSN76 - introduction, BUSN76 Performance measurement & management. Lund University School of Economics and Management, Available at: <https://liveatlund.lu.se> [Accessed on 20 May 2017].
- Leahy, T., 2004. Fitting the Balanced Scorecard Into BPM. *Business Finance*, Vol. 10, pp. 27 - 32.
- Lebas, M. J., 1995. Performance measurement and performance management. *International Journal of Production Economics*, Vol. 41, pp. 23 - 35.
- Lynch, R. L., and K F. Cross. 1992. The SMART way to define and sustain success. *National Productivity Review*, Vol. 8, pp. 23 – 33.
- Merchant, K. and Van der Stede, W., 2007. Management Control Systems: Performance Measurement, Evaluation and Incentives, 2nd ed. FT Prentice-Hall, Harlow.
- Mintzberg, H., 1978. Patterns in Strategy Formation. *Management Science*. Vol. 24, pp. 934 - 948.
- Nadarajah, D. and Kadir, S. L. S. A., 2014. Measuring Business Process Management using business process orientation and process improvement initiatives. *Business Process Management Journal*, Vol. 22, pp. 1069 - 1078.
- Neely, A., 2005. The evolution of performance measurement research: Developments in the last decade and a research agenda for the next. *International Journal of Operations & Production Management*, Vol. 25, pp. 1264 - 1277.
- Neely, A., Adams, C. and Crowe, P., 2001. The performance prism in practice. *Measuring Business Excellence*, Vol. 5, pp. 6 - 13.
- Nenadál, J., 2008. Process performance measurement in manufacturing organizations. *International Journal of Productivity and Performance Management*, Vol. 57, pp. 460 - 467.
- Neubauer, T., 2009. An empirical study about the status of business process management. *Business Process Management Journal*, Vol. 15, pp. 166 - 183.
- Nudurupati, S. S., Bititci, U. S., Kumar, V. and Chan, F. T. S., 2011. State of the art literature review on performance measurement. *Journal Computers and Industrial Engineering*, Vol. 60, pp. 279 - 290.
- Otley, D., 1999. Performance management: a framework: for management control systems research. *Management Accounting Research*. Vol. 10, pp. 363 - 382.
- Porter, M. E., 1996, What is Strategy?. *Harvard Business Review*, Nov-Dec issue, pp. 62 - 78.
- Robson, I., 2004. From process measurement to performance improvement. *Business Process Management Journal*, Vol. 10, pp. 510 - 521.
- Sahoo, C. K. and Jena, S., 2012. Organizational performance management system: exploring the manufacturing sectors. *Industrial and Commercial Training*. Vol. 44, pp. 296 - 302.
- Sanchez-Ruiz, L. and Blanco, B., 2016. How do companies implement Process Management? The case of Cantabria companies. *Business, Management and Economics Research*, Vol. 2, pp. 1 - 9.
- Shishmanian, D. and Bogdan, C., 2008. Defining performance indicators for industrial and logistic cross-enterprise processes: Theoretical and empirical considerations. *IEEE International Technology Management Conference*, pp. 1 - 8.
- Silva, da L. A., Damian, I. P. M. and Pádua, de S. I, D., 2012. Process management tasks and barriers: functional to process approach. *Business Process Management Journal*, Vol. 18, pp. 762 - 776.
- Škrinjar, R., Štemberger I. M. and Hernaus, T., 2007. The impact of business process orientation on organizational performance, Proceedings of the 2007 Informing Science and IT Education Joint Conference.
- Smith, R. F., 2007. Business Process Management and the Balanced Scorecard: Using Processes as Strategic Drivers. John Wiley & Sons, Inc., New Jersey.
- Taticchi, P., Toneli, F. and Cagnazzo, L., 2010. Performance measurement and management: a literature review and a research agenda. *Measuring Business Excellence*. Vol. 14, pp. 4 - 18.

- Trochim, W. M. K., 2006. Qualitative Validity, Available at:  
<http://www.socialresearchmethods.net/kb/qualval.php> [Accessed on 11 Apr 2017].
- Tupa, J., 2010. Process Performance Measurement as Part of Business Process Management in Manufacturing Area. In: M. Pomffyová, ed. 2010. *Process Management*. Croatia: INTECH. Ch, 2.
- Van Looy, A. and Shafagatova, A., 2016. Business process performance measurement: a structured literature review of indicators, measures and metrics, *SpringerPlus*, Vol. 5.
- Venanzi, D., 2010. Financial Performance Measures and Value Creation: A Review. *SSRN Electronic Journal*, December issue, pp. 1 - 36.
- Vernadat, F., Shah, L., Etienne, A. and Siadat, A., 2013. VR-PMS: a new approach for performance measurement and management of industrial systems, *Industrial Journal of Production Research*, Vol. 51, pp. 7420 - 7438.
- Weske, M., 2012. *Business Process Management - Concepts, Languages, Architectures*. (2ed ed.) Springer Verlag, Heidelberg.
- Wieland, U., Fischer, M., Pfitzner, M. and Hilbert, A., 2015. Process performance measurement system – towards a customer-oriented solution, *Business Process Management Journal*, Vol. 21, pp. 312 – 331.
- Yin, R. K., 2014. *Case Study Research: Design and Methods*. (5th ed.). Sage Publications Inc., California.

## 8. Appendix

### *Appendix 1 – Interview Questions*



LUND UNIVERSITY

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**Interviewer:**

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**Interviewee:**

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<b>Function at Krone</b>	<b>Years in Company</b>	<b>Date(s) of Interview</b>	<b>Duration of Interview (h)</b>
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#### ***General questions regarding process orientation***

1. What goals do you think Krone is trying to achieve with the focus on process orientation?
  - a. Why was it necessary to change?
2. How is Krone changing towards process orientation?
  - a. How is this change communicated throughout the organization?
  - b. Who is accountable for the identified processes?
3. In how far are you involved/informed about the change towards a process oriented organization?
4. How far is Krone/your department in the process of changing to process orientation?

#### ***Questions regarding the set and use of performance indicators***

1. How are your performance indicators (later described as set of performance indicators) are developed regarding the latest process orientation at Krone?
  - a. What steps have you undertaken to define the set of performance indicators for your or a specific process? (Co-development or decided by top management?)
  - b. How do you define specific performance indicators for each process?
  - c. Do performance indicators in one process guide towards the same purpose or can we find differences in the purpose?
  - d. What types of performance indicators do you use in your set? (e.g. leading, lagging indicators; categories of measures etc.)
  - e. How do you ensure that your set of performance indicators, especially process performance indicators, are in line with Krones corporate strategy?
2. Does your team faces challenges towards the definition of the set of performance indicators?
  - a. Which ones are you facing?
  - b. Why do you think you face these challenges?
  - c. How do you solve or try to solve them?
  - d. Where do you see future challenges?
3. How do you use of the set of performance indicators to support performance improvements? (Please provide one example)
  - a. Could you characterize your set of performance indicators? (for example, flexible, transparent, independent etc.)
  - b. Who is using the set of performance indicators and how are they used?
  - c. Do you see challenges with the use of performance indicators?

#### ***Optional personal perspective questions for challenge management***

1. How do you think the set of performance indicators should be designed regarding process orientation to support performance improvements?
2. Why do you think that is a good design?