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Implementing Performance Management - a Bottom-up Perspective

A CASE STUDY OF A MANUFACTURING FIRM

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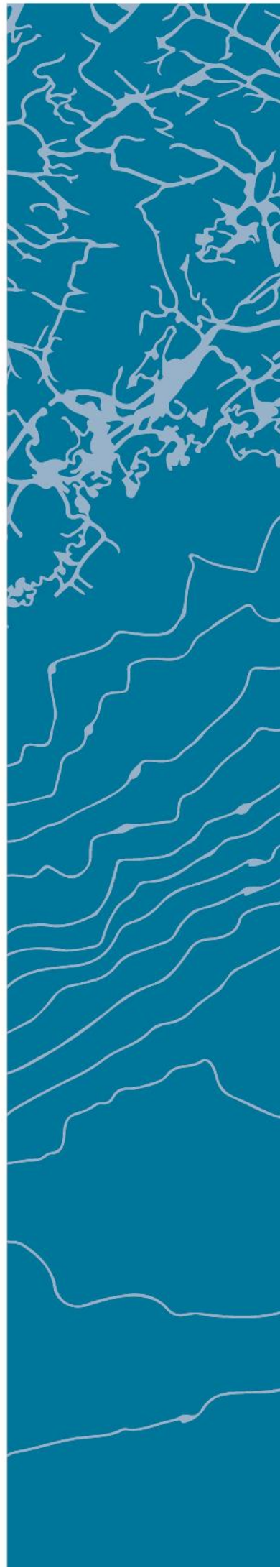Industrial Economics and Technology Management

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I

I. Summary

In 2016, a world-class manufacturing plant, determined to remain competitive in the future, develop a business system to spread their vision and values throughout the organization. This business, inspired by principles from both *Lean* and *Toyota Production System*, has greatly emphasized the *Kaizen Philosophy* – where subordinates play a key role in the optimization of their work processes. This led to a plethora of process improvements, yet as the lack of focus was prominent, and the impact of these improvement efforts was hard to measure.

Management acknowledged a need for strategic directions, and in 2017 a pilot project to implement performance management was launched. However, as suggested by Jordan and Messner (2012), implementation of *performance management systems* are quite complicated. Furthermore, literature suggests user involvement during the design phase could be beneficial (Wouters & Wilderom, 2008). Thus, with aspirations to draw on their first-hand experience to increase the *completeness*, two departments developed their own *key performance indicators* (KPIs). This single-case study has, through qualitative interviews and observations, examined how the bottom-up development has influenced the completeness of these KPIs and the middle-management's perception of the process.

The findings of this thesis suggest that a bottom-up development dramatically increases the completeness of the KPIs from the subordinate's perspective. Nonetheless, the specificity of these KPIs intensify the incompleteness of the KPIs from management's perspective, who actively search for the bigger picture. Even though both neither middle-managers involved in the project personally utilized, to a great extent, the performance management data, both were pleased with the *learning* and the enhanced *internal transparency* outcomes from the project.

II. Table of Contents

List of Figures

List of Tables

1.0 Introduction

This case study examines a medium-sized processing plant of a land-based industry located in Norway. The plant is located towards the back-end of a long value chain stretching across several nations which distributes product globally. The plant performs the final production step before the product is shipped to the customer.

To remain competitive in the future the company decided there was a need to optimize processes within the organization. A personalized business system was developed to satisfy the needs of the plant. With the dedicated efforts of a small department and a handful of experienced operators, most of the sub-departments in the plant adopted the core values of the business system. One major contribution from the business system has been the implementation of the *Kaizen Philosophy*, where the operators are actively engaged in continuous improvements efforts; this philosophy is deeply rooted in the *Toyota Production System* (TPS). This has paved the way for some tremendous improvements in various production processes and work procedures across the plant.

Management was greatly impressed with the efforts meanwhile acknowledging the need for strategic directions to fully reap the benefits of these improvements. To align the improvement work with a strategic direction of the plan, a two-phased pilot project was initiated. The project would implement *performance management* in two sub-departments to harvest valuable experience before a full-scale implementation across the plant was finalized. The initial phase was used by upper-management to appoint the strategic directions declared as vital to ensure continued success at the plant. This was then complemented by the second phase of the project, where two sub-departments developed their own key performance indicators based on the strategic objectives appointed by management. The chosen research questions for this case study are the following:

- How does bottom-up development of key performance indicators (KPIs) affect the (in)completeness of the indicators?
- How does middle-management perceive this bottom-up development process?

2.0 Theory

Both *performance measurement* and *performance management* has been commonly identified as vital means to secure effectiveness and efficiency in any business (Melnyk, Bititci, Platts, Tobias, & Andersen, 2014). Performance measurement can be briefly described as *what to measure* (Smith & Bititci, 2017, p. 1209), whereas performance management is characterized by *how to use the measures to manage organizations' performance* (Smith & Bititci, 2017, p. 1209). The main focus of this paper will be on performance management, yet the roots of performance measurement lie within *...organisational and management control theories emerging from general systems theory* (Smith & Bititci, 2017, p. 1208). Therefore, it is natural to discuss the essential groundwork of management accounting before we delve into performance management. The first section of this chapter will describe management accounting, control and management control systems, performance measurement and performance management, and finally, limitations to accounting measurements and suggestions to overcome these challenges.

2.1 Introduction to Management Accounting and Control

Management Accounting (MA) is outlined as the act of collecting useful information for the organizational management (Coombs, Jenkins, & Hobbs, 2005). This information labeled *Accounting Data* can provide useful insight for both decision-making and for management of organizational members (McWatters, Zimmerman, & Morse, 2008). Furthermore, *Accounting Data* can be used for evaluation (McWatters et al., 2008), planning, and control purposes (Burns & Scapens, 2000). That companies utilizes management accounting is not a recent occurrence, as Hopwood already in 1972 highlighted accounting data as one of the most important sources of information to an organization (Hopwood, 1972).

There are no universal rules as to how an organization should design and perform their management accounting procedures (McWatters et al., 2008). Every organization is diversely unique and as a direct result a *one size fits all* motto is ineffective and inapplicable. Diversity steams from the established organizational culture, history, and even the organization's goals; this diversity leads to significant variations in the utilization of management accounting from one company to another (Heinzelmann, 2017). Therefore the management accounting practices must be adapted to the processes of the given organization (McWatters et al., 2008). This phenomenon is addressed by the *Contingency Approach to Management Accounting*, which suggests specific characteristics of an accounting system should be based on the given circumstances (Otley, 1980).

Due the vast application areas, MA data holds different shapes in accordance with the purpose of the information (Coombs et al., 2005). For instance, accounting measures might be financial or non-financial, provide quite specific information or give broad estimates, be based on historical data or give future predictions. The format of which the data is presented is largely dependent on what information is being captured. Therefore, accounting data can be presented as numbers, tables, graphical distributions, written reports, or verbal communication, to mention a few (Coombs et al., 2005).

2.1.1 Context Matters - Industry Specifics

MA practices are strongly influenced by the context in which it operates. For instance, the practices found at a hospital will differ considerably from those found at a bank (Messner, 2016). Further, a manufacturing company that requires an inventory will undoubtedly perform

their management accounting activities differently than a service oriented company who holds no spare parts (Messner, 2016). Messner (2016) highlights a reciprocal relationship between accounting practices and the context of which the organization operates. Thus, accounting practices will be shaped by the context, yet accounting practices will also shape context. There is a plethora of factors that dictate the context of which the company operates. For instance, the size, the objective (for-profit or non-profit), style of ownership (public or private), or type of industry the company operates within are all influencers of context (Messner, 2016).

Messner (2016) primarily emphasizes on contexts determined by *industry specifics* in his paper, suggesting two ways to conceptualize the context of an industry. The first is the set of core activities which are commonly identified with the respective industry. Examples of such could be money lending within the banking industry or producing land-based vehicles within the automotive industry. These activities account for the most significant differences between companies of diverse industries. The second way in which Messner (2016) conceptualize industries is by*, associating it with differences in organizational practices that correlate with industry affiliation. Organizational practices are industry-specific in this sense if they can be empirically traced to the firms within a particular industry without however being part of the definition of that industry* (p.105). An example of this could be a bank conducting a risk assessment which is correlated to the bank's money lending practices (Messner, 2016). The activity does not define the industry itself, but risk assessments are often associated with the banking industry.

2.1.2 Managerial Control

Control is an essential feature within the organization. Organizations' that lack control may experience serious harm to both their financial position and their reputation (Merchant & Van der Stede, 2007). This can ultimately lead to bankruptcy (Merchant & Van der Stede, 2007). However, there is no uniformly agreed upon definition for the term control (Merchant & Van der Stede, 2007). In a recent article by Smith and Bititci (2017), control is defined as, *the process assuring that the organization does what the management wants done* (p.1208). In other words, control is the process in which management aligns organizational effort to accomplish their responsibilities. To assist management, organizations often develop formalized systems to utilize the data collected through MA practices (Burns & Scapens,

2000). When these systems are utilized to sustain or change organizational behavior they can be labeled as *control systems* (Simons, 1995).

It is commonly endorsed that good a Management Control System (MCS) is important for an organization (Merchant & Van der Stede, 2007). Chenhall (2003) characterizes a MCS as a system that coordinates the use of MA to reach specified objective(s) while also including a control perspective. Simons (1994) defines a MCS as, *the formal, information-based routines and procedures used by managers to maintain or alter patterns in organizational activities* (p.170). Being *proactive* rather than *reactive* is a vital trait of a MCS (Merchant & Van der Stede, 2007). This means the system is designed to handle issues preventively before the organization suffers from problems it could have caused (Merchant & Van der Stede, 2007).

2.2 Management Control Systems – A Type of Formalization

Adler and Borys (1996) used the term *formalization* to describe how prominent written rules, operation procedures, and instructions are within an organization. The introduction of a MCS can therefore be regarded as a type of formalization. Even though these systems are often useful in the eyes of upper management, they are not always equally welcomed by the subordinates. According to Adler and Borys (1996) formal rules associated with the formalization process can be regarded as either *good* or *bad*. Good rules are commonly accepted and are rarely questioned by employees, whereas bad rules are resented (Adler & Borys, 1996).

2.2.1 Enabling and Coercive Systems

Adler and Borys (1996) distinguish between good and bad rules labeling the formal systems as either *enabling* or *coercive* respectively. *Enabling systems* leave room for user improvements when shortcomings are revealed. This means that imperfect systems are no longer regarded as strictly problematic, but rather considered as a means for user learning. A *coercive system* on the other hand is very different. To outline this Adler and Borys (1996) draw upon Richard E. Walton's article, *Toward a strategy of eliciting employee commitment based on policies of mutuality* (1985), quoting, *they are a substitute for, rather than a complement to commitment* (p.69). The coercive system is focused on enforcing employee compliance, rather than creating an encouraging environment where employees contribute to organizational learning in the pursuance of *best practices* (Adler & Borys, 1996). The framework distinguishes *enabling* and *coercive* formalization among the three following dimensions: *1) characteristics of the system*, *2) the process of designing the system*, and *3) the implementation of the system* (Wouters & Wilderom, 2008, p. 489).

2.2.2 Characteristics of the System

According to Adler and Borys (1996) an enabling system has the following four characteristics: *repair*, *internal transparency, global transparency*, and *flexibility*. Repair refers to the operator's ability to make corrections to the system addressing its shortcomings; thereby, in a sense repair becomes an opportunity (Adler & Borys, 1996). Toyota's employee participation, where operators are strongly encouraged to propose suggestions on how to improve standard operation procedures (Liker, 2005), is an excellent example of the repair phenomena (Adler & Borys, 1996). On the other hand internal transparency characterizes the user's understanding of the components, routines, and process that s/he interacts with inside the department (Ahrens & Chapman, 2004). It also provides the user with feedback from its

performance compared to historical standards, which can be useful for developing *best practice routines* (Adler & Borys, 1996). *Global transparency* in this context describes user's understanding of the surrounding processes performed in other departments and units of the organization (Ahrens & Chapman, 2004). In other words, how much of the bigger picture is revealed to the user and how well s/he understands how his or her work affects the organization as a whole (Adler & Borys, 1996). Last, *flexibility* refers to the user's to ability overrule or even bypass the control system if found necessary (Adler & Borys, 1996). This can be compared to the autopilot system in an aircraft. The system is left in control to make decisions on its own, however the pilot can overrule the system at any point if s/he finds it necessary (Adler & Borys, 1996).

2.2.3 The Development Phase - Designing and Implementing the System

The design phase of the formal system is regarded as the second dimension of formalization (Adler & Borys, 1996). Given that subordinates have applicable experience and resources available, enabling systems will include subordinates in the design process. Direct involvement in development of work procedures will presumably lead to better attitude and morale among the subordinates in addition to superior technical outcome of the procedures. The third dimension of formalization is the implementation of the formal system. A system intended to be enabling, entailing enabling features and characteristics, may actually become coercive if the implementation itself is coercive (Adler & Borys, 1996, p. 76).

According to Wouters and Wilderom (2008) it can be challenging to differentiate between activities related specifically to the *design* and the *implementation* of the system. They, therefore, suggest combining the two and labeling it the *development process*. Examples of performance measurement activities that go into this process could be: developing and maintaining the well suited performance measurements, collecting relevant measurement data to determine the actual output of measures, create an information system for reporting the outcome of the collected performance data, selecting appropriate targets for the performance measures, and; reviewing and revising both specific measures and as well as the entire performance measurement system on a regular basis (Wouters & Wilderom, 2008).

2.2.4 Xerox Photocopiers – Illustrative Example

Adler and Borys (1996) uses Xerox photocopiers from the 1970s as a metaphor to highlight the differences between an enabling and coercive system. For many years Xerox's philosophy was to make the engineering design in their printers so thorough that the system itself would be fault proof. This meant that user interaction in terms of troubleshooting should not be necessary. However, from time to time the photocopiers broke down. As more and more features were added to the copiers they got increasingly complex, resulting in an increased breakdown rate. This was frustrating for the user who in many cases abandoned the photocopier. Because the design was intended for limited user interaction, users quickly realized attempting to fix the photocopier was a waste of time. This was a coercive system. The trend of higher downtime in the photocopiers led to increased expenses from the growing number of service calls (Adler & Borys, 1996).

To tackle this Xerox had to weigh their options (Adler & Borys, 1996). The first option was investing even more time and effort into perfecting the design to prevent further breakdowns; however, this would make the machines even more complex and harder to use. A second option was giving the specialized machine operators an even longer and more extensive training; this approach was not competitive with the Japanese models that were much easier to operate, and even allowed employees with less training to make their own copies. Therefore, a third option that made drastic changes in the development process was chosen. Xerox chose to host an iterative development process where active discussions among the end-users, the designers, and the business decision makers led to the development of several prototypes. This delivered greater insight into Xerox's design flaws and identified new directional opportunities for Xerox (Adler & Borys, 1996). This the new approach could be regarded as *enabling*.

2.3 Performance Measurement

Since the publication of Johnson and Kaplan's famous work, *Relevance lost: The rise and fall of management accounting* (1987)*,* performance management has and gained popularity (Smith & Bititci, 2017). Numerous extensive frameworks have emerged in recent years, suggesting how to best structure a performance measurement system. Some popular examples of such are *The Balanced Scorecard* by Kaplan and Norton (1996) and *Performance Hierarchies* by Epstein and Manzoni's (1998), (Hall, 2008). This section will further elaborate on the terms performance measurement and performance measurement systems.

Lohman, Fortuin, and Wouters (2004) portrays *performance measurement* [1] as an activity carried out by management to meet strategic goals and objectives based on the company's strategy. The aim is to support and monitor the implementation of strategic incentives. These incentives can come in shape of both financial and non-financial performance measurements. The company's strategy is communicated throughout the organization through the selected measures and their chosen targets (Lohman et al., 2004). Neely, Gregory, and Platts (1995) defines performance measurement as*, the process of quantifying the efficiency and effectiveness of action* (p.80). In this respect the term effectiveness relates to what degree the customer's needs are fulfilled, while efficiency expresses how economically the firm's assets are being utilized while meeting a certain level of customer satisfaction (Neely et al., 1995).

2.3.1 Criteria for Selecting Performance Measures

Armstrong (2006) proposes a set of criteria for selecting appropriate performance measures. For instance, performance measures must be related to the *strategic goals* that drives the business performance of the organization. The measures must be relevant for *objectives* of single members and the teams within the organization. Measures must be *clearly defined* to distinguish the level of accomplishment based on the measured outcome, and the data must be *verifiable* to evaluate to what degree expectations have been met. Finally, the performance measures must be *precise*, *comprehensive* and address the *key features* of performance in order to provide useful feedback (pp. 54-55).

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[1] *Key performance measure* and *key performance indicator* (KPI) are synonyms that are often used interchangeably in the literature (Ferreira & Otley, 2009, p. 271).

2.3.2 Classification of Performance Measures

Similar to Management Accounting, performance measures may come in various formats. Armstrong (2006) suggests that all performance measurements can be placed within five overhead captions: *finance, output, impact, reaction,* and *time. Financial* measures could for instance indicate income, costs, rates of return, whereas *output* measures could measure characteristics such as number of units produced, throughput time, or new accountants. *Impact* measures can assess qualities such as attainment of a quality standard, completion of work or degree of innovativeness. *Reaction* describes the perception of the given department and its outputs by outsiders, both internal and external parties such as colleges and customers. *Time* indicates characteristics such as the frequency of achievements, time to market, response time, and work left in the backlog (p.55).

2.3.3 The Performance Measurement System

To collect relevant data from various activities within the organization, *performance measurement systems* are being developed. Neely et al. (1995) defines a performance measurement system as, *the set of metrics used to quantify both efficiency and effectiveness of actions* (p.81). These systems combine a platter of individual performance measures to monitor performance in the abundance of processes. For a performance measurement system to be compelling, it must consider strategic and environmental factors that speak to the business aspects, while also considering the organization's structure, processes, functions, and relationships (Bititci, Carrie, & McDevitt, 1997).

Neely et al. (1995) provides a model to describe the nature of the performance measurement system with three sublevels; these include: *individual performance measures*, *performance measurement system* and *the environment*, demonstrated in Neely et al.'s model (See Figure 1). The *individual performance measures* can be found residing in the center of the model. These are measures Lohman et al. (2004) suggest managers in an organization utilize in order to meet predefined goals based on the overall strategic objectives of the company (Lohman et al., 2004). Surrounding the individual measures is a circle which illustrates the performance measurement system described prior. Finally, the outer square represents the *environment*. When the performance measurement system is being developed it must be fitted to the environment that the organization operates within (Neely et al., 1995).

Neely et al. (1995) further divides the environment into two dimensions, the *internal environment* and *the external* environment. The *internal environment* is characterized by the organization itself. The chosen evaluation criteria, the type of information gathered by

performance measures, and organizational culture, are all examples of factors that can shape the internal environment. Furthermore, the *external environment* is yet again two folded, constructed from both the expectations and actions of the organization's *customers* and the *competitors*. Customer satisfaction could for instance be a factor that shapes the external environment. To satisfy the customer's expectations, performance measures on quality could be desirable. The competitors' impact on the external environment on the other hand could be related to benchmarking. These are measurements comparing the competitors' performance to one's own. Examples of such could be innovation rates through new product development, or gross assembly hours required for competing products (Neely et al., 1995).
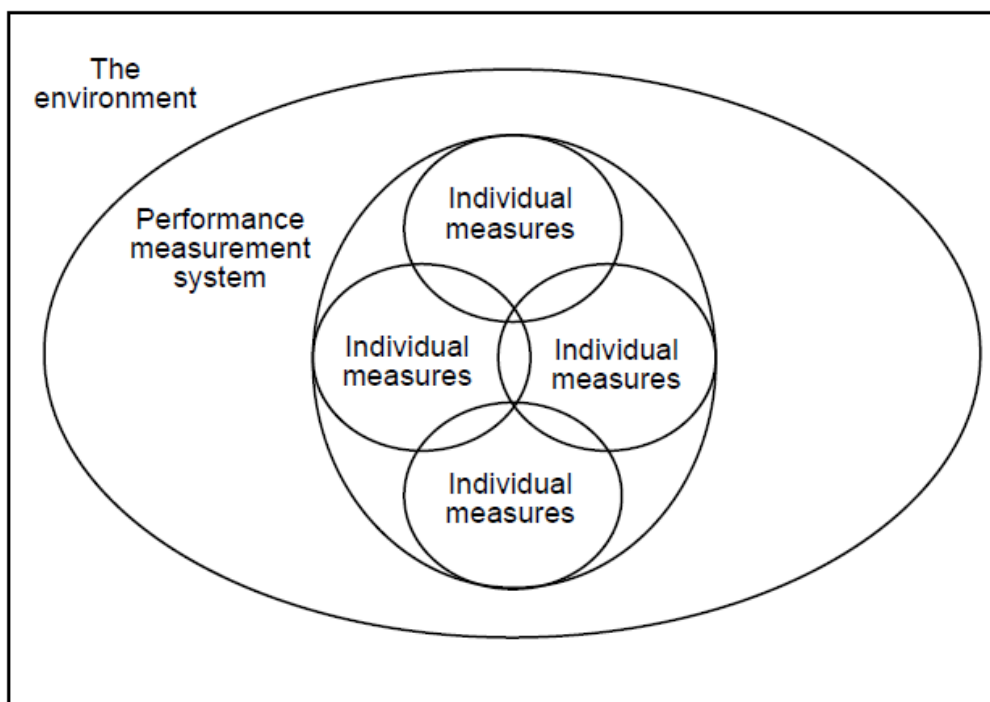

Figure 1, The nature of the performance measurement systems.

Retrieved from, *Performance measurement system design:*
A literature review and research agenda. Neely, Gregory, and Platts (1995, p. 81).

2.4 Performance Management

Even though the performance measurement system is essential for management (Melnyk et al., 2014), it is not adequate to manage an organization on its own. To achieve this a *performance management system (PMS)* should be implemented (Melnyk et al., 2014). Bititci et al. (1997) describes the performance management (PM) process as the plethora of systems that combined allows an organization to manage its performance. According to Bititci et al. (1997) examples of such systems are, *strategy development and review; management accounting; management by objectives; non-financial performance measures –informal; non-financial performance measures – formal; incentive/bonus scheme; personnel appraisal and review* (p.524). The performance management process allows companies to align their efforts by creating a proactive closed-loop control system (Bititci et al., 1997). Management can deploy corporate strategies into the various departments and processes of the organization, while feedback is retrieved from the system. Management can then use this information in the process of vital decision-making (Bititci et al., 1997).

A visualization of the performance management process is shown in *Figure 2*. *Vision* represents the top of the pyramid, followed by the *business objectives*, *strategic goals*, *critical success factors*, *critical tasks & an action plan*, and last is the *performance measures* which represents the base of the pyramid. In this manner management's vision is broken down into tangible measures that can be used to monitor progress towards the objectives. The purpose of the deployment phase is to ensure that the performance measures are reflecting the business objectives and policies of the organization, establishing consistency between the measurements throughout the hierarchy, and ensuring that measures are relevant for the respective area of deployment (Bititci et al., 1997, p. 527). The loop is completed with the feedback retrieved from the performance measures, which allows for management to measure and manage processes accordingly.
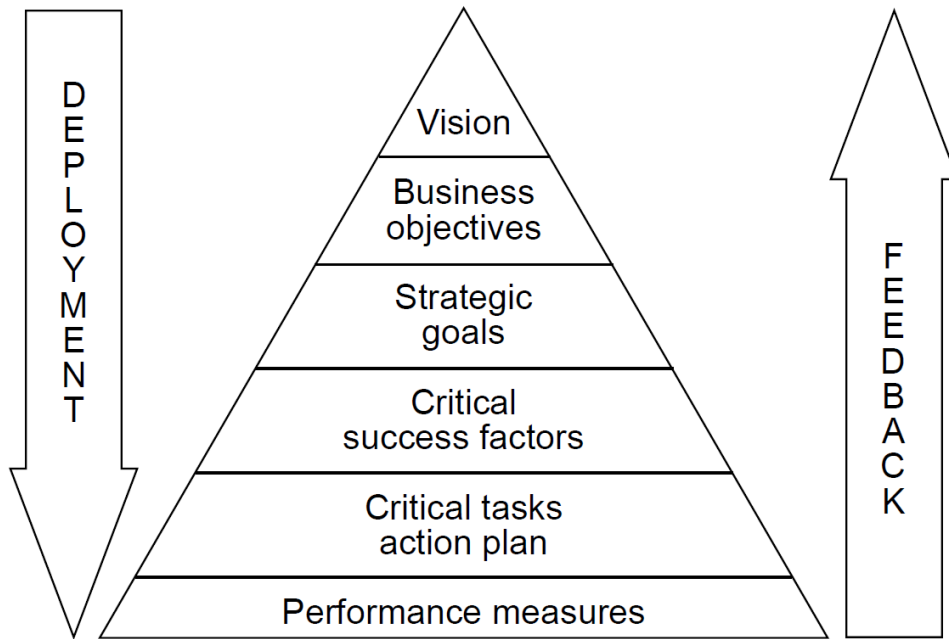
Figure 2, the closed loop performance management process.

Retrieved from*: Integrated performance measurement systems:
a development guide.* Bititci, Carrie, and McDevitt (1997, p.524).

2.4.1 The Performance Management System

To facilitate the process, a performance management system (PMS) must be developed.
Ferreira and Otley (2009) portrayed the PMS with the *nervous system* of the organization.
Furthermore, they define a performance management system as,

> *The evolving formal and informal mechanisms, processes, systems, and networks used*
> *by organizations for conveying the key objectives and goals elicited by management,*
> *for assisting the strategic process and ongoing management through analysis,*
> *planning, measurement, control, rewarding, and broadly managing performance, and*
> *for supporting and facilitating organizational learning and change* (p.264).

This broad definition entails many of the features highlighted in the model purposed by Bititci
et al. (1997) in *Figure 2*. For instance, conveying the vision, goals, and key objectives
throughout the organization is the very backbone of the deployment phase. A balanced
interaction between formal and informal mechanisms and processes are crucial success factors
in a finetuned management system. Measurement and analysis of the performance, planning,
supporting, and facilitating organizational learning and change, are all vital processes which
completes the continuous closed-loop process.

13

Ferreira and Otley (2009) is suggests a framework with twelve questions to address central aspects in the design and implementation phase on a PMS. There are ten *what-questions* and two *how*-questions which addresses the following topics:

Q.1- Vision and Mission

Q.2 - Key Success Factors

Q.3 - Organization Structure

Q.4 - Strategies and Plans

Q.5 - Key Performance Measures

Q.6 - Target Settings

Q.7 Performance Evaluation

Q.8 - Reward System

Q.9 - Information Flows Systems and Networks

Q10 - PMSs use

Q.11 - PMSs change

Q.12 - Strength and Coherence of the System, (pp.267-268).

This full list of questions can be found in *Appendix A*.

2.5 Control Challenges

Selecting appropriate performance measurements can be challenging. Armstrong (2006) highlighted, the current factors measured in an organization are often what is easily measured. Sardonically, many activities that are meaningful are immeasurable, and several activities that are measurable are meaningless (Armstrong, 2006).

2.5.1 Purpose of Measures

The purpose of the accounting data collected within an organization may differ. Hopwood (1972) emphasized that data from accounting systems are often meant to provide information relevant for several purposes and may therefore fail to perfectly satisfy the needs for one particular purpose (Hopwood, 1972). Moers (2006) elaborates on this phenomena by categorizing measurements as either *aggregate* or *specific*. The *aggregate performance measures* are meant to provide some information about all actions. These types of measurements are well suited for decision making between available trade-offs. Aggregate measures often appear as financial measurements such as *net income* or *return on assets* (Moers, 2006). A *specific performance measure* on the other hand, only provides information on a chosen subset of actions (Moers, 2006). These are often nonfinancial types of measures, and could, for instance, be related to the quality of work carried out by the agent, where a measurement could be the defect-rate on the output (Moers, 2006).

2.5.2 Accuracy

For accounting data to be reliable it is important that the information provided is precise. The *accuracy* of a performance measure is a twofold concept entailing both *precision* and *objectivity* (Merchant, 2006). Precision expresses the lack of variance in the measurement(s) and determines how reliably a measure can be assigned a value over a given timespan. If measures lack precision the value of the information generated decreases because the information can be misinterpreted and give improper incentives. Yet, there are other aspects of performance which are harder to quantify, such as employee morale, effectiveness, and corporate reputation. These are referred to as objective measures. For a measurement to be truly objective it must be bias-free. It is therefore crucial that these measures are performed by independent parties, who are not directly involved in the process. An example of a potential bias measurement could be a manager who is evaluated on product quality, but left to perform his own evaluation of quality without upper management having insight in the process (Merchant, 2006, pp. 896-897).

2.5.3 Incompleteness of Performance Measurements

The *quality* of a performance measure is a threefold concept, and determined by the *sensitivity*, the degree of *precision*, and the *verifiability* of the outcome measure (Moers, 2006, p. 901). Moers (2006) highlights his understanding of these concepts in this context as, *(1) the manager's actions (sensitivity), outside the control of the manager (precision), and (3) the measurement (verifiability)* (p.899). Even though management accounting provide useful information for management (Coombs et al., 2005), accounting measures are far from perfect indicators of performance (Merchant & Van der Stede, 2007). These shortcomings are not a newly discovered phenomenon. Already in 1972, Hopwood found accounting data to be the most important source of information for many organizations, while suggesting that these indicators are usually incomplete or biased (Hopwood, 1972). There is a plethora of reasons why the accounting information may not provide a perfect representation of what is being measured. The imperfection could be resulting from the complex nature of the organization, which in turn yields an incomplete representation (Chapman, 1997). A more severe reason for misrepresentations in accounting data is data altering for personal gains. Hopwood (1972) expresses concern with the endless documented examples of managers or subordinates adjusting accounting information in pursuance of make the accounting reports appear more favorable for the sake of personal gain. Since this information is such a vital tool for decision-making, this type of behavior can greatly harm the organization in the long haul (Hopwood, 1972, p. 156).

In 2012 Jordan and Messner (2012) describe the phenomena of *incomplete accounting information* as data that does not describe all dimensions of performance regarded as relevant for the organization or the manager, and can therefore provide an incomplete representation of the organizations performance (Jordan & Messner, 2012). Jordan and Messner (2012) further distinguished incomplete measures into either *broad* or *narrow* degree of incompleteness. An indicator with a narrow degree of incompleteness can be corrected by rather simplistic means, such as making alterations to what the indicator measures. Such an action would be labeled as a *repair process* in framework of Adler and Borys (1996). An indicator with a broad degree of incompleteness, on the other hand, is characterized by measuring something vastly different than initially intended; so much so that the indicator cannot be repaired as the narrow indicator can. In cases of broad incompletes, it is suggested to introduce a new indicator and/or pay less attention to the broad incomplete indicator. In the framework of Adler and

Borys (1996), this process would be regarded as *flexible* since as the system is overruled or even bypassed (Jordan & Messner, 2012).

2.5.4 Employee Participation

This begs the question, what can organizations do to increase the quality of their performance measures? In pursuance of better indicators some organizations have included employees in the development process of their performance indicators. This approach can be described as enabling in (Adler and Borys (1996). Wagner (1994) labels this act *participatory management practices* which he defines as, *the involvement of managers and their subordinates in information-processing, decision-making, or problem-solving endeavors* (p.312). According to Cotton, Vollrath, Froggatt, Lengnick-Hall, and Jennings (1988) employee participation is positively correlated with performance effectiveness. Further, their study indicated that long-term involvement had greater effect than short-term participation, and direct involvement in decision-making process had a greater impact on effectiveness than indirect influence through indirect organs such as employee representatives (Cotton et al., 1988, p. 17). A recent study by Groen, Wilderom, and Wouters (2017) also found employee participation in development of performance measures directly correlated to higher-quality performance measurements. The improvements in quality in turn gave the employees an enhanced feeling of control over their own contribution, which gave rise to higher job performance (Groen et al., 2017, p. 126).

When examining the effect of employee participation it is important to be explicit about the extent to which the employees have contributed (Cawley, Keeping, & Levy, 1998, p. 616). Dachler and Wilpert (1978) classified *the level of participation* that subordinates have in decision-making into the three categories: *formal-informal*, *direct-indirect*, and *level of influence* that the members have in the decision-making (Dachler & Wilpert, 1978, pp. 12-14). *Formal participation* has established systems or procedures in place to secure employee participation, whereas *informal participation* may appear as casual conversations between superiors and the subordinates (Cotton et al., 1988, p. 9). *Direct to indirect* portray to what extent the participants have access to the, *decision-making process, the range of people or organizational units to be included in direct-participation systems, and the base of legitimacy on which the direct-participation system is developed.* (Dachler & Wilpert, 1978, p. 12). The final category, the *level of influence*, is divided into six levels where the degree influence gradually increases. Dachler and Wilpert (1978) wrote,

(1) No (advance) information is given to employees about a decision to be taken.

(2) Employees are informed in advance of the decision to be made.

(3) Employees can give their opinion about the decision to be made.

(4) Employees' opinions are taken into account in the decision process.

(5) Employees have a veto, either negatively by blocking a decision that has been made, or positively by having to concur in advance.

(6) The decision is completely in the hands of organization members, with no distinction between managers and subordinates (p.14).

The first option is keeping the employee mostly in the dark and far away from the decision-making process. The second alternative is still not allowing for any employee participation, but employees are now being informed of the process before a final decision is made. The third approach is allowing the employees to express their opinion, even though it may not affect the outcome. The fourth opinion is taking the employees expressed opinion into consideration when a decision is being made. The fifth alternative allows employees to veto decisions, and the sixth option leaves the decision-making solely in the hands of the employees, with no interference from management.

2.5.5 Self-Interest, Opportunism, and Agency Theory

Even though employee participation may lead to higher quality measures and better employee performance, it could potentially pave way for employees to exploit the system. Williamson (1985) labels this act as *self-interest seeking* behavior and proposes three weighted levels to characterize them. The strongest from of self-interest seeking behavior is called *opportunism*. Examples of such behavior are lying, stealing, or cheating. The act of opportunism refers to give, *... incomplete or distorted disclosure of information, especially to calculated efforts to mislead, distort, disguise, obfuscate, or otherwise confuse* (Williamson, 1985, p. 47). Opportunism is accountable for what is termed *asymmetrical information*[2] (Williamson, 1985). This phenomenon is described as the *agency theory*.

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[2] BusinessDictionary defines information asymmetry as a, *Situation that favors the more knowledgeable party in a transaction. In most markets (especially where the goods being traded are of uncertain quality, such as used equipment), a seller's is usually in a more advantageous position because his or her store of information is based on numerous sales conducted over the years. A buyer's information, however, is based usually on an experience of only a few purchases. A similar situation exists between a commercial lender and a borrower* (Asymmetry, 2018).

The origins of agency theory date back to the 1960's (Eisenhardt, 1989), when risk was shared among cooperating parties with contrasting stances toward risk. The *agency problem* occurs when these cooperating parties have, … *different goals and division of labor* (Eisenhardt, 1989, p. 58). The two parties are described as *the principal* who assign tasks and *the agent* who completes the tasks. The first issue addressed by the theory emerge when the goals of the principal do not align with the ones of the agent. The challenge for the principal is to confirm that the agent has acted appropriately, but monitoring the agent's activity is challenging or expensive (Eisenhardt, 1989). In essence, all behavior within the organization could be controlled if it were not for opportunism (Williamson, 1985).

The second level is the *simple self-interest seeking* behavior (Williamson, 1985). Within this category the parties are no longer trying hide their wants and desires. Employees will capitalize when, *parties realize all advantages the that their wealth, resources, patents, know-how, and so forth lawfully entitle them* (Williamson, 1985, p. 49). However, these desires are visible from the beginning, and no behavioral surprises are to be expected thereafter. *Obedience* is the final category suggested by Williamson (1985). This is an adverse extreme to opportunism, in which all self-interest behavior has perished (Williamson, 1985).

2.5.6 Knowledge Creation - Organizational Learning

Learning is a vital feature in any successful organization. Garvin, Edmondson, and Gino (2008) highlight just how essential this process is by stating,

> *With tougher competition, technology advances, and shifting customer preferences, it's more crucial than ever that companies become learning organizations. In a learning organization, employees continually create, acquire, and transfer knowledge - helping their company adapt to the unpredictable faster than rivals can* (p.1).

In the famous work of David A. Kolb (1984) *Experimental Learning: Experience as the Source of Learning and Development*, Kolb introduces the *learning cycle* (Illeris, 2009); (Klakegg, 2017). However, this theory primarily concerns individual learning, which is only a part of the process (Klakegg, 2017).

Nonaka and Takeuchi (1995) explicitly states it is not the organization itself that creates knowledge, but rather the interactions between groups and individuals within the organization (Nonaka & Takeuchi, 1995). The knowledge can be*, amplified or crystallized at the group*

level through dialogue, discussion, experience sharing, and observation (p.13). Further, Nonaka and Takeuchi (1995) suggest some of the success in Japanese companies steams from the broad involvement in the process of creating knowledge. Ranging from front-line employees to middle and senior level management, each has its own role in this process. Front-line employees have explicit detailed knowledge of the day-to-day operations. However, it can prove difficult for the front-line employee to transfer this information into useful knowledge as well as conveying the relevance of the information to others. Another challenge is that the information could be very context specific and may not be easily translatable. Thus the role of the manager is to aid the employees to make sense of their experience, and turn it into useful knowledge (Nonaka & Takeuchi, 1995).

Garvin et al. (2008) suggest three specific traits that are crucial for organizational learning: *a supportive learning environment*, *concrete learning processes and practices*, and *leadership that reinforces learning*. These are addressed as the*, building blocks of the learning organization (Garvin et al., 2008, p. 3)*. The *first building block* entails four specific features: p*sychological safety*, characterized by how comfortable the employees feel to express their ideas without the fear of being belittled, a*ppreciation of differences* which suggests learning occurs when employees are exposed to new ideas through different worldviews -which can directly boost motivation-, *openness to new ideas*, which encourages employees to explore the unknown and take greater risks, and the final feature is *time for reflection*. In a nutshell, this simply means to give employees some breathing room in order to relieve stress and pave way for analytical thinking (Garvin et al., 2008, p. 3).

Knowledge can only flow seamlessly throughout the organization if a well-established process allowing information to travel is efficiently put in place. The *second building block* that is crucial for organizational learning is to have *concrete learning processes and practices* established (Garvin et al., 2008). For organizational learning to occur, knowledge must be shared within the organization. This can be vertical or lateral, between individuals, between groups, or the entire organization. The focus of the sharing process can be *internal* or *external*. The internal focus may consist of formal post-project audits or reviews to enhance performance in future projects or endeavors. On the other hand, external focus could take place as discussions with customers or industry experts to gain access to new insights and challenges for the company (Garvin et al., 2008).

Finally, organizational learning is largely dependent on behavior of management. This is therefore addressed by the *third building block, a leadership that reinforces learning* (Garvin et al., 2008). Discussions and debates that occurs when management actively inquire and listen to the employees can greatly stimulate organizational learning. According to Garvin et al. (2008) this signalizes:

> *...the importance of spending time on problem identification, knowledge transfer, and reflective post-audits, these activities are likely to flourish. When people in power demonstrate through their own behavior a willingness to entertain alternative points of view, employees feel emboldened to offer new ideas and options* (p.4).

For both creativity and organizational learning to flourish, it is therefore essential that management take an active role and persistently engage in discussions with the subordinates.

3.0 Methods

The aim of this section is to establish the theoretical foundation of the methodical approach of this study. Ahrens and Chapman (2006) highlight five central concepts: *theory*, *domain*, *methodology*, *hypothesis*, and *method*, as shown in *Figure 3*.

Concept	Meaning	Relevance	Example
Theory	A set of explanatory concepts	Usefulness for addressing the research question	Agency theory, functionalism, management control theory, symbolic interactionism
Domain	A space in which data is collected	Usefulness for addressing the research question	Field, CRISP tape, historical archive, internet
Methodology	A general approach to studying research topics	Usefulness for addressing the research question	Qualitative methodology, positivism
Hypothesis	A testable proposition	Validity	Relationships between management accounting and strategy
Method	A specific research technique	Fit with theory, hypothesis, methodology, and domain	Interviews, observations, questionnaires, conversation analysis

Figure 3, Five essential research concepts.

Retrieved from: *Doing qualitative field research in management accounting: Positioning data to contribute to theory,* Ahrens and Chapman (2006, p. 821).

Theory characterizes explanatory concepts such as *Agency Theory* (Ahrens & Chapman, 2006), or theoretical concepts outlined in Chapter 2 like the *Contingency Approach* to management accounting. The *domain* characterizes under which circumstances data has been collected (Ahrens & Chapman, 2006). A *hypothesis* is an idea or a proposition that a researcher may test in order to discover relationships in theory (Ahrens & Chapman, 2006). Ahrens and Chapman (2006) explicitly distinguish *method* from *methodology* within field studies. *Methodology* can be,...*understood as a general approach to a study of research topics* (Ahrens & Chapman, 2006, p. 819), whereas a *method* is a specific research technique which can be applied by researchers with different methodologies (Ahrens & Chapman, 2006).

This thesis is a case study on performance management which lies within the field of management accounting research. Hence, this will be the focus of the remainder of this chapter.

3.1 The Shift in Management Accounting Research

Traditional accounting research has generally been relying on large data sets, and often statistical methods has been applied (Cooper & Morgan, 2008). However, during the late 70's researchers began to express their concern about the current state and direction accounting research as, *lack of consensus in the academic arena, there are problems with the relationship between accounting theorizing and organizational practice* (Chua, 1986, p. 602). This was addressed during the late 80's, as greater emphasis to better understand how organizations utilize management accounting and *case studies* became increasingly popular among accounting researchers (Keating, 1995). According to Cooper and Morgan (2008) case study research complements the traditional accounting research. While traditional accounting research is generally better to answer "how much" questions addressing accounting measures such as *return on asset* (ROA), case studies are often advantageous when answering "why" questions (Cooper & Morgan, 2008).

3.1.1 Case Studies

The purpose of a case study is to capture the complexity of the single case that is being investigated (Stake, 1995, p. xi). Feagin, Orum, and Sjoberg (1991) define a case study as, *…an in-depth, multifaceted investigation, using qualitative research methods, of a single phenomenon. The study is conducted in great detail and often relies on the use of several data sources* (p.2). Due to the in-depth information it provides on a given organization, case study research is often adequate approach when answering "how" and "why" questions (Cooper & Morgan, 2008).

3.2 Data Collection for Qualitative Research

Even though a case study research has been chosen it does not dictate the specific methods and theories that should be applied in the study (Cooper & Morgan, 2008, p. 160). Yet, as *qualitative data* is information that has a non-numerical format (Easterby-Smith, Thorpe, & Jackson, 2015), there are some commonalities. Travers (2001) highlights the five main methods used for data collection qualitative researchers as: *observations*, *interviews*, *ethnographic fieldwork*, *discourse analysis*, and *textual analysis* (p.2). This study has relied on interviews, observations, and textual analysis. Therefore, only these will be highlighted in the following sections.

3.2.1 Interviews

According to Silverman (2011), interviews are considered a time-effective method in comparison to other methods (Silverman, 2011, p. 166). When interviewing an *informant*, it is essential that s/he has great knowledge of the topic of interest and is willing to share this information (Stake, 1995). There are serval approaches to how to conduct an interview, and Silverman (2011) divides interviews into four distinct categories: *structured interviews, semi-structured interviews, open-ended interviews*, and *focus groups* (p.162). However, he emphasizes that there is no best style of interviewing and the choice should be based on the purpose of the interview (Silverman, 2011).

3.3.2 Semi-Structured Interviews

The aim of the *qualitative interview* is to retrieve rich, in-depth descriptive answers instead brief answers or simple "yes" and "no" responses (Stake, 1995). Instead, the researcher is interested in the lived experience of the interviewee and the potential stories that s/he can tell. Therefore, qualitative interviews seldom rely on rigorous surveys where all interviewees are asked precisely the same questions. Instead, the researcher prepares a short list of *issue-oriented questions* to guide the interviewee through the interview (Stake, 1995). This type of interview is called *a semi-structured interview* and is commonly used in accounting research (Mahama & Khalifa, 2017). This list of prepared questions gives the interviewer flexibility, which allows for exploration of interesting and perhaps unexpected topics during the interview (Mahama & Khalifa, 2017).

To craft the list of relevant questions prior to the semi-structured interview, the interviewer should be aware of the relevant theory regarding the topic (Mahama & Khalifa, 2017). Thus, a *literature review* of relevant theory will be beneficial while formulating questions.

Furthermore, a literature review also benefits the researcher during the analysis phase, as the researcher gets a more informed point of view (Mahama & Khalifa, 2017).

3.3.3 Formulating good Interview Questions

According to Patton (2002) well-formulated questions in qualitative research has three distinctive traits. The question must be, *open-ended, natural, singular and clear* (Patton, 2002, p. 353). Open-ended questions is phrased in a manner that gives the interviewee few restrictions when discussing a topic (Mahama & Khalifa, 2017). The purpose is to let the interviewee highlight the aspects and experience that s/he finds most prominent regarding the topic. *Natural questions* are questions that are free from implicit assumptions, which means that the question does not indicate how the interviewer perceives the issue. Furthermore, these questions do not force the interviewee to reply in a manner, predetermined by the interviewer. Thus, leading questions must be avoided (Mahama & Khalifa, 2017). Finally, the questions should be *singular,* meaning that the questions must to only contain one prompt (Mahama & Khalifa, 2017). A question that holds more than one question is labelled as a *double-barreled question*. The issue with double-barreled questions is that it could be challenging for the interviewee to determine which aspect of the question s/he should address (Mahama & Khalifa, 2017).

Furthermore, the wording of the interview questions is important, as certain words and phrases could hold a very specific meaning in different companies and organizations (Mahama & Khalifa, 2017). Thus, cultural knowledge and familiarity with the "everyday language" of the interviewee is essential when formulating good interview questions (Mahama & Khalifa, 2017).

3.2.4 Observations

In addition to interviews, observational data can be a useful source to complement the data collection for a case study. When a qualitative researcher attends meetings and other events as an *observant*, it is essential that the researcher is keeping good records of occurring events (Stake, 1995). Here, the researcher should describe the scene but let the occasion portray the circumstance and its issues (Stake, 1995). In other words, the researcher must describe the events in an objective manner. This provides a rather *incontestable description*, useful for in-depth analysis and further reporting (Stake, 1995). If possible, it is recommended to document observations shortly after their occurrence while the observation is still fresh (Stake, 1995).

3.2.5 Textual Analysis

According to Yin (2009) collected documents can also play a crucial role in case study research. For instance, textual data could provide the researcher with vital information prior to field observations. However, it is important to keep in mind the possibility of this internal data to be bias, and must therefore be used carefully (Yin, 2009). When a researcher is collecting data through examination of documents the data collection process quite similar to the collection process from interviews and observations (Stake, 1995). It is vital that the researcher has an open mind when collecting while also being aware of unexpected clues to appear (Stake, 1995). Textual analysis can be applied to a platter of written material, ranging from written material found on a web page to a message pinned on a notice board (Travers, 2001).

3.3 The Research Process and the Data Analyses

The research process in qualitative field studies are more often than not anything but linear. Ahrens and Chapman (2006) describes the process as a, *continuous back and forth questioning of interpretations and discussion of recorded field data* (p.833). A similar movement pattern often occurs between *research question*, *the relevant theory*, and the e*mpirical findings* to find a plausible fit (Ahrens & Chapman, 2006, p. 836). Heinzelmann (2017) describes this process as an *iterative* or *reflexive* research process.

Stake (1995) describes *data analysis* as the process of picking something (the data) apart. Furthermore, he emphasizes that this process does not have a specific beginning (Stake, 1995). Cooper and Morgan (2008) suggest that case study on its own does not determine how to analyze the collected data. However, to organize the information gathered through the data collection, *qualitative coding* is often applied. Qualitative coding is the practice of applying tags to bits and pieces of your data, which allow the researcher to compare and evaluate the data (Silverman, 2011). The coding practice may differ slightly, ranging from highlighting words, sentences, or paragraphs to more extensive and descriptive tags (Silverman, 2011).

3.4 Quality Assurance

Even though case study research can provide useful accounting data to complement the traditional accounting research (Cooper & Morgan, 2008), there are also limitations to case studies. For instance, Easterby-Smith et al. (2015) highlight that case studies are often criticized as they, *...rarely allow generalization to be made from specific cases to the general population; and they produce huge piles of data, which allow researchers to make any interpretations they want* (p.89). Some researchers even suggest that qualitative field studies are nothing more than story-telling, where the results at best can be tested with "proper scientific methods" later on (Ahrens & Chapman, 2006).

However, the concepts of *validity* and *reliability* are important concepts in research, also in qualitative field research. Easterby-Smith et al. (2015) define validity as, *the extent to which measures and research findings provide accurate representation of the things they are supposed to be describing* (p.343). Reliability, on the other hand, is achieved, *if a later investigator followed the same procedures as described by an earlier investigator and conducted the same case study all over again, the later investigator should arrive at the same findings and conclusions* (Yin, 2009, p. 45).

Yet, for qualitative data it is difficult to distinguish between the validity and reliability (Ahrens & Chapman, 2006). Instead, to gain validity in qualitative field studies a concept called *triangulation* is often utilized (Ahrens & Chapman, 2006). Technically triangulation refers to a method typically used for boats to determine their position. The concept revolves around drawing lines between three static objects located on land on a map, which further creates a triangle that holds your position. These lines from the fixed locations represent the different sources of data, which in this sense creates *evidence* to support the case. Ahrens and Chapman (2006) believe the proposed *certainty* of this evidence is misleading and instead suggest using the term *trustworthy*, which is also a commonly used concepts in qualitative field studies (Ahrens & Chapman, 2006). For instance Covaleski, Dirsmith, Heian, and Samuel (1998) describes several steps similar to the triangulation by securing multiple sources, to secure the *trustworthiness* of their study (Covaleski et al., 1998).

4.0 Research Design

The first section of this chapter will highlight the context unto which the case study was conducted. The second part of the chapter will outline the strategic needs and planning of the pilot project, which is the focus of this case study. Finally, in the third section the research design for this case study will be outlined. The purpose of a research design is to organize the research activities in a manner that is likely to accomplish the aim of the research (Easterby-Smith et al., 2015).

4.1 Case Context

This thesis is relying on a qualitative field study of a single organization where two of the organization's sub-departments have been studied in detail. The plant has hundreds of employees and is also a part of a long value chain; the plant receives partially processed raw material. The production at the plant is continuous and is being overseen by a workforce of five individual work-teams. These work-teams employ the plant 24 hours a day and consist of roughly 17 operators. For simplicity, the work-teams will be referred to as *the 24/7 shifts*.

The Business System Team - BST

In recent years the plant has focused on systematical optimization work throughout the organization. In 2013, a department, for the sake of this thesis is referred to as the *Business System Team (BST)* was established. The aim of this department is to constitute a new work culture at the plant, grounded in plant's own *Business System*, developed in 2016. This business system builds on principles from both *Lean* and *Toyota Production System*, combined with the values and goals of the plant. All members of BST are experienced process operators and middle-managers from different departments in the plant. Hence, these members have a strong understanding many of the production processes in many of the departments.

One essential idea that the BST is conveying is the *Kaizen philosophy* (Liker, 2005). Due to the persistency of BST most departments have implemented Kaizen boards and host regular meetings to discuss process improvements. The BST's have played an essential role in implementing these improvements, such as mandating departments facilitate the work improvement meetings.

These Kaizen boards revolve around a 2x2 matrix where the department themselves arrange the improvement ideas suggested by its operators. The first axis of the matrix represents the perceived benefit of the improvement, whereas the second shows a combination of estimated

costs and a rough estimation for the difficulty in implementation of the improvement. First and foremost, a cost-benefit assessment is conducted and the ideas with the greatest potential are the primary focus. These are found in the right-hand corner of the matrix. To avoid oversaturation of the Kaizen board only a limited number of ideas can be placed in the matrix at once; this aids in keeping the department focused.

The Critical Process Team – CPT

There are thousands, if not millions, of sub-processes at the plant; all of which are important for the plant to run at full capacity. Even though every process is important, some are regarded as *critical*. These are processes that quickly lead to a halt in the overall production of the plant if they break down; therefore, control over critical processes is essential. To identify and target these processes in the improvement work throughout the plant, interdisciplinary teams has been established. These teams typically consist of experienced operators from the respective department accompanied 24/7 shift operators, engineers, mechanics and/or electricians, depending on the needs of the project. These teams are referred to as the *Critical Process Team* (CTP).

4.2 The Pilot Project– The Needs and the Strategy

Since the establishment of the BST and its emphasis on the Kaizen philosophy, thousands of processes have been improved at the plant. Even though upper-management was impressed with the number of process improvements, they also recognized the lack of strategic direction to the improvements. Until now, the focus of the improvements has been scattered and rather difficult to measure the impact of the work improvements. In efforts to align the continuous improvement work, a pilot project was launched early in 2017. The idea was to implement PM into the organization by merging a *top-down* with a *bottom-up* approach to implementation. The *top-down phase* of the project began as upper-management, consisting of the CEO and the division managers, addressing the *high level key challenges* for the plant. The purpose was to determine the *current state* and to appoint a strategic direction to remain relevant, profitable, and competitive in the future. A list of prioritized areas, which would serve as the foundation for bottom-up phase of the project, was crafted.

The second phase was initiated in the fourth quarter of 2017 as two sub-departments joined the pilot project. These will be referred to as *department A* and *department B.* This bottom-up phase began with a workshop led by an external consultant. Here, each department had brought their middle-manager along with a few experienced operators. During the first half of the workshop the consultant introduced the concept of PM. Here he emphasized how this would be a useful tool for the departments as it would allow them to communicate directly to upper-management. He also stressed the implementation of PM was done to measure the process, not the operators. Thereby confirming PM was not an additional control tool for management. The second half of the workshop was spent having the departments appoint five problematic areas within their department. These areas would be used in the design process of the PM and were meant to be the foundation of specific KPIs.

The purpose of this *bottom-up* approach was to let departments themselves utilize their first-hand understanding of the processes to choose the "right" indicators to support chosen strategic targets. In this manner the strategic course set by management would be broken down into concrete goals and measurements through the KPIs. After the workshop the two departments were given the freedom to develop KPIs they themselves believed were best suited for this purpose. However, it was clear that upper-management would intervene if the KPIs were perceived as irrelevant. This was never communicated to the departments themselves.

4.2.1 The Organizational Layout of the Project

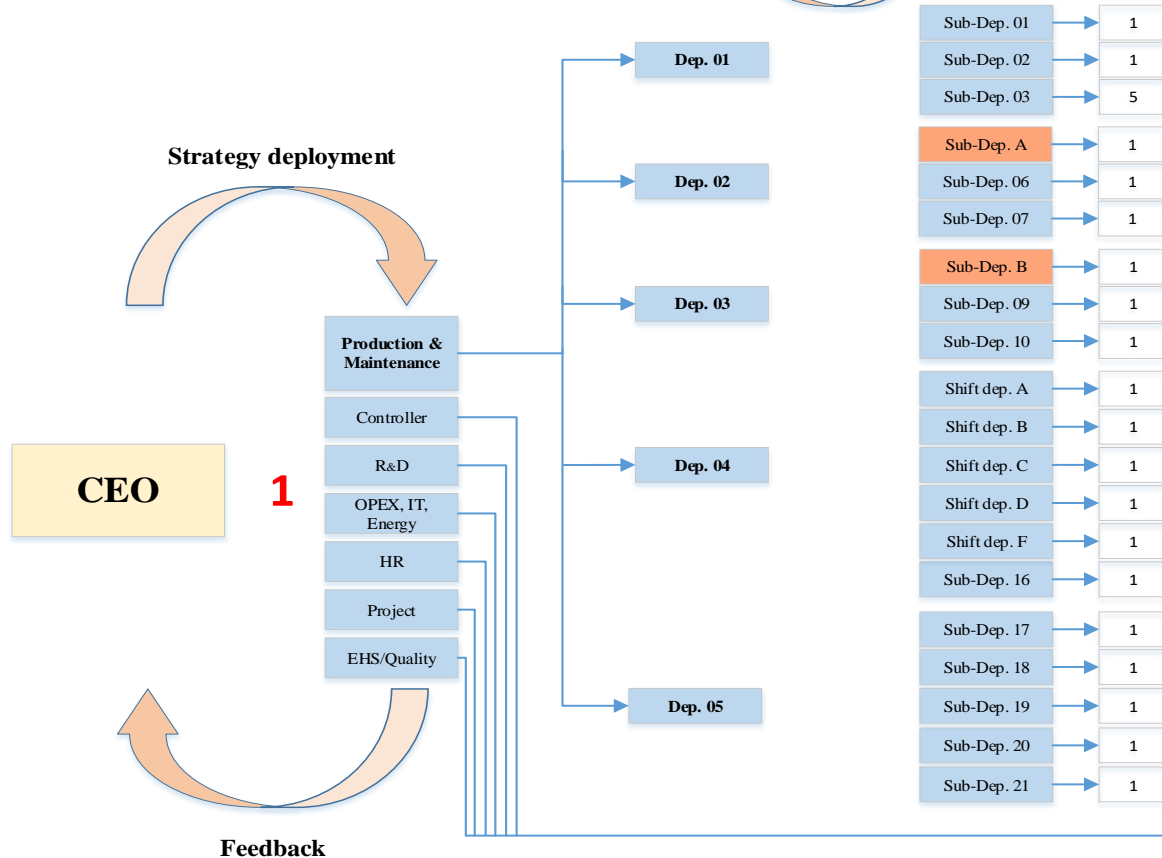Already during the top-down phase the desired layout of the implementation was planned out, (see *Figure 4*). Here, the PM would be used to establish a continuous feedback-loop where the upper-management would communicate the strategic direction to the organization, and the sub-departments would be able to communicate their issues and needs back to upper-management. This feedback-loop was to be established using four sub-loops, represented by the red numbers ranging from one to four. On the left-hand side is the *first loop* that connects between the CEO and the division-managers of the plant. The *second loop* connects between the division-managers and the department-managers. The *third loop* highlights the interaction between the department-manager and the middle-manager. In addition to that the engineering manager for the respective area is present in this feedback loop. Last, the *fourth loop* runs between the middle-manager and the operators. Here we can also find department A and department B that partook in the bottom-up phase of the project.

Overall the PM structure allows upper-management to communicate the strategic goals and vision that would be broken down into more concrete goals throughout the hierarchy, finalized as actual KPIs at the operational level. Furthermore, the feedback from these loops would allow the sub-departments to communicate their progress, struggles and needs back to upper-management. The purpose of the four loops throughout the feedback process was to communicate these needs in terms that upper-management could relate to thereby providing sufficient support and resources.

Figure 4, The desired structure of the PM project within the organizational.

4.3 The Data Collection Process

The data collection process for this thesis has relied on several sources, and the field research has consisted of several visits to the plant. The main source of information has been *interviews*, but the student researcher has also observed seven meetings and two workshops where the pilot project was discussed. Finally, some *textual data* has also been collected. Even though limited textual data were available, the main purpose of this data has been to support the validity of the study.

4.3.1 The Interviews

In total nine semi-structured interviews were conducted in the period between January and April of 2018, primarily in March and April. All interviews were recorded with the consent of the interviewee(s). The recorded length of the interviews ranged from 10 minutes to 35 minutes, yet some had an informal conversation before and after the recording started.

Eight out of the nine interviews were conducted face to face. The ninth interview was done over a video call. This was due to convenience, since the interviewee takes residence outside of Norway. The interviews have been conducted with parties both from within and outside of the two respective departments. This was to get as many relevant perspectives on the case as practically possible. Further, two of the interviews were conducted with several interviewees present. These were the initial interviews with the two departments. A lot of data were generated on the topic, which was further used in the later interviews.

All nine interviews were transcribed which produced roughly 30,000 words, equivalent to about 40 pages. This was done to allow for coding and further analysis of the data. The codes were selected primarily based on terms from literature, as discussed in *Chapter 2*.

The following codes were retrieved from theory and has utilized for the data analysis:

- The Data Collection Process
- The Design Phase
- Involvement
- The Implementation Phase
- Learning
- Utilization of Performance Management
- Internal Follow-up
- External Follow-up
- Completeness
- Quality
- Revision
- The performance management process in the eyes of the middle-manager

4.3.2 How the Interviews were Conducted

All the interviews were conducted in Norwegian to ensure there would be no language barrier for the interviewees. There were two main reasons for this: first, the idea was that the informant would feel more comfortable and relaxed in their native language, and second, it was believed that this would allow the informant to better articulate themselves, ensuring rich details and perspectives would not be lost in translation. Some of the interviews started off as a conversation between the interviewee and the researcher regarding the topic prior to the recorded audio. That being said, most of the interviews started with an icebreaker question. This was meant to get the interviewee feeling more confident, preparing for a smooth transition into the more specific questions. This was also kept in mind during the interviews. Even though the interviews were semi-structured, the researcher let the informants, to a large degree, express themselves freely, guiding the interview along certain key topics.

Table 1 shows a list of all the interviews that were conducted for this thesis. The first interview was a conversation with a division manager in mid-January. The purpose of this interview was to reveal the general idea of the project, discussing among other issues the joint top-down and bottom-up approach. For both the second and third interview, the two departments from the pilot project (department A and department B) had gathered their key informants who had been working closely to the performance management process. In

addition to that, the middle manager for each department was also present. These interviews were used to collect large amounts of data on the performance management process. Yet, having multiple interviewees present during the interview may have influenced the how the interviewees expressed themselves. In order to capture the perspective and the stories of the individual operators along with the middle-managers, several one-on-one interviews were conducted. Here, separate interview guides were made for each interview in order to investigate the perspective of both middle managers and the operators in greater detail.

In addition to this, two interviews were also conducted with individuals who were not directly involved in the pilot project. The first of these was an interview with a middle-manager of the 24/7 shifts, responsible continuous operation of the plant. His perspective was especially interesting because his operators were running the plant, whereas the operators within department A and department B had the maintenance responsibility. This understanding is shared in almost all interviews. In the final interview the perspective of the consultant, who held the workshop where performance management, was introduced to the two respective departments in the pilot project. The purpose of this interview was to highlight the consultant's perspective, comparing the plants to his prior cases, while also addressing his opinion on the pilot project. The interview process was concluded as the researcher began to hear the same stories and remarks over again from different individuals, seen as a sign of saturation within the data collection. An interview guide can be found in *Appendix B.*

Table 1, The list of interviews that was conducted

Date	Interview number	Recording Duration	Number of interviewees	Relation
17.01.18	01	17:37	1	BST
06.03.18	02	32:15	2	Dep. A
06.03.18	03	24:00	3	Dep. B
12.03.18	04	10:18	1	Shift
03.04.18	05	15:19	1	Dep. B
04.04.18	06	34:59	1	Dep. A
04.04.18	07	20:32	1	Dep.B
13.04.18	08	23:24	1	Dep. A
20.04.18	09	20:18	1	Consultant

The Meetings

The student researcher attended a total of eight meetings related to the pilot project on performance management, as highlighted in *Table 2*. The meetings took place between October 2017 and April 2018. None of these were recorded due to the risk of restricting the attendants' ability to freely express themselves. Only handwritten notes were taken by the student researcher during these sessions.

The first and the eighth meeting were workshops where the middle-managers and a few chosen operators of the two departments involved in the pilot project (dep. A and dep. B) attended. These were held by an external consultant. The first workshop had an extensive introduction to PM, with a less theoretical and more practical approach to the topic. The consultant put great emphasis on the fact that this was the department's way to*, communicate to management, and not another control tool for management to utilize*. The consultant also expressed the idea of uniting the performance management process with the kaizen boards in the department. The second half of the workshop was used for the respective departments to select five areas they were struggling with. The idea was to help the departments through the selection process and let the departments themselves develop specific KPIs related to each of troubling areas.

The second meeting was an internal meeting where the BST attempted to coordinate their efforts for 2018, and the PM project was among the topics. During the third meeting the division-manager of the BST outlined the strategic idea of the pilot project for the researcher and explained how it was meant to fit into the organizational structure. The fourth and the fifth meeting were both status updates with the two specific departments (A and B) prior to a workshop the following day. Here, a representative from each department gave a brief overview of their progress. The sixth meeting intended to summarize the meeting held the first day, where the BST and the consultant discussed what was witnessed regarding the project that day.

In the seventh meeting, the consultant and upper-management were discussing the strategic plans and directions of the project. Finally, the eighth meeting was a second workshop with mostly the same participants as the first workshop. However, one key player was missing, department A's middle-manager. The consultant used the first half of the meeting to reiterate related theory while discussing this in the context of the two departments. The second half

was used for internal discussions on how the departments could better display one of their KPIs on the PM board in their own department.

Even though eight meetings were attended, not all were equally rewarding in terms of data collected for the student researcher. However, the various perspectives and extended time span aided the researcher in portraying the bigger picture of the project.

Table 2, The list of observed workshops and meetings

Date	Meeting number	Duration	Departments involved	Participants
19.10.17 (Workshop 1 - Introducing Performance Management)	01	150 min	A, B, BST	• Middle-manager, Dep. A • 2 Operators, Dep. A • Middle-manager, Dep. B • Operators, Dep. B • Department manager, BST • Middle-manager, BST • 3 BST members • Consultant • Observer (The student researcher)
15.11.17 *(BST's Coordination meeting for 2018. Performance management was among the things discussed here)*	02	120 min	BST	• Division-manager, BST • Controller • 4 BST members • Observer (The student researcher)
16.11.17 *(Meeting/question session. Outlining the general idea of the PM process)*	03	45 min	None	• Division-manager, BST • The researcher
03.04.18 *(Status update prior to the workshop)*	04	30 min	A, BST	• 2 Operator, Dep. A • Division-manager, BST • Middle-manager, BST • Consultant • Observer (The student researcher)
03.04.18 *(Status update prior to the workshop)*	05	30 min	B, BST	• Middle-Manager, Dep. B • 1 Operator, Dep. B • Department-manager, BST • Middle-manager, BST • Consultant • Observer (The student researcher)
03.04.18 *(Wrap-up/summary and preparation for the next day)*	06	30 min	BST	• Division-manager, BST • Consultant • Observer (The student researcher)
04.04.18 *(Upper-management, Updating the strategic direction of the top-down perspective of the project)*	07	60 min	Upper-management, production and maintenance departments	• 6 Division-managers • Middle-manager, BST • Consultant • Observer (The student researcher)
04.04.18 *(Workshop 2 – Follow-up on the process, steering it more towards the Kaizen board and PDCA)*	08	90 min	A, B, BST	• 2 Operators, Dep. A • Middle-manager, Dep. B • 3 Operators, Dep. B • Department manager, BST • Middle-manager, BST • 2 BST members • Consultant • Observer (The student researcher)

Textual Data

The amount of textual data collected has been rather limited, due to the minimal amount of available material. For instance, data collection related to all the KPIs had not yet begun when the data collection period for this project was concluded in the end of April 2018. However, some data were collected. For instance, spreadsheets for data collection has been retrieved as well as actual live data dating back several months from the technical control system. These have been fruitful to support the data validity.

5.0 Empirical Analysis

This chapter will present the findings from the data collection process, presented in three sections. The first two sections will highlight the individual findings from each of the two departments. Here, the specific traits of the two departments is displayed, follow by the individual codes that was used for data analysis, presented in Chapter 4. The structure of these will be as follows:

- The Individual Traits of the Department
- The Data Collection Process
- The Design Phase
- Involvement
- The Implementation Phase
- Learning
- Utilization of Performance Management
- Internal Follow-up
- External Follow-up
- Completeness
- Quality
- Revision
- The performance management process in the eyes of the middle-manager

Finally, the third section of the chapter will present the consultant's perspective of the case.

5.1 Department A

The Individual Traits of Department A

Department A is one of the front-end departments at the plant with fourteen employees and is responsible for three separate production areas. The operators here have a rotational work schedule, meaning that an operator will not be working in the same part of the vicinity two weeks in a row. The department's role at the plant is to receive and process raw material that it distributes to the following departments. There are two types of raw material that arrives by vast shipments, ranging from 6.000 to 12.000 tons. As these shipments arrive, many of the operators put their regular work routines aside and merge into a 24-hour shift rotation to unload the shipment as quickly as possible. This state typically lasts one to two days as the operators unload roughly 200 tons per hour. This skews the work schedule for the operators that work in the afternoon and the night hours, as they will not attend work for regular hours the following day. To further complicate things, the unloading process is weather dependent. The first of the two raw materials is quite sensitive to water. Thus, the unloading process will only take place when the weather is dry and there are calm wind conditions. Both the middle-manager and an operator from the department explains just how fragile the unloading process is, *if it rains for a week, then the unloading will take an extra week* (Operator 1, dep. A.; MM. dep. A). The unloading of the second material it not as sensitive as the first but could also be delayed by poor weather conditions.

The arrival of shipments dramatically influences the everyday work operations of the department, as fewer operators are available to perform the essential work operations. To counterbalance this the 24/7 shift supplies the department with operators to aid the department. A benefit from this practice is the experience these shift operators receive when learning the routines and practices of the department. Having trained shift operators who can handle operate the equipment in department A, during unexpected stops situations outside regular working hours advantageous, since department A's equipment is vital for supplying the plant with raw materials.

The Data Collection Process

Initially department *A* chose five problematic areas for KPI development during the first workshop. However, shortly after a sixth indicator was added. This was reviled during an interview when the initial five KPIs were addressed,

… you mentioned five, we have six [KPIs]. We added one. We added it since it was quite precarious since things were happening there we decided to do some data collection there also (Operator 1, dep.A). Instead of replacing a KPI the department decided to add an additional KPI where issues were rapidly occurring. This would also allow the operators to get comfortable with collecting process data, as most of them were had not been exposed to this way of working before. A list of the chosen KPIs can be found in Table 3.

Table 3, List of chosen Key Performance Indicators selected by department A

Indicator number	Category
A1	*Production*
A2	*Cost*
A3	*Production* and *Cost*
A4	*Safety* and *Quality*
A5	*Safety*
A6	*Production*

The middle-manager reported one of the KPIs to his superior, and the data collection for this was persistent throughout the entire project span. However, the data collection for the remainder of the KPIs were inconsistent. One KPI had a three-week collection period, and another two were only collected for about two months. For the remaining KPIs, no data was collected. When addressing the five KPIs that the middle-manager did not submit to his superior, an operator in the department said,

> *Interviewee: No data have been collected lately.*
> *Interviewer: What do you mean by lately?*
> *Interviewee: That is… Well, we began to collect data right before the new year [the beginning of 2018], right after [the new year begun] and for a little while after that. So, let's say [during] the last two months almost, I do not think anyone has collected any data* –Operator 1, dep. A.

43

This interview took place early in April, and the data collection process likely ended sometime between January and February of 2018.

The Design Phase

During the selection process of problematic areas at the initial workshop, both a division manager and the consultant actively partook in the discussions. However, since then no further strategic direction was given by upper management, and the departments were free to select their KPIs as they saw fit. Nonetheless, the department itself had some criteria in the selection process. An operator made the following claim in an interview,

> *... we chose some KPIs on topics that we are working with, and to which we can relate, and which we also have to ability to influence and to monitor. Thus, we can say, Look! It is actually a problem! So, we attempt to make them relate to what we are experiencing at least* –Operator 1, dep. A.

Involvement

Both the middle-manager and the operators of department A had been actively involved in the design of the KPIs. Although the 24/7 shift holds a central role in the department they were not consolidated during the design phase of the KPIs. Furthermore, the middle-manager of one of the shift departments not only confirmed that they were not involved, he also added that he was not aware of what KPIs had been selected.

When asking if members of department *A* thought it would have been natural to include the 24/7 shift in the design process and if they involve in the development of future KPIs an operator replied, *it depends on what the KPI is addressing* (Operator 1 dep. A). After reflecting on the issue for a while, he said: *...but yes, to include them? Yes, to make them feel included* (Operator 1 dep. A). When asking the middle-manager the same question he replied, *Yes, for KPIs that they are directly involved with, that could be sensible* (MM. dep A).

The Implementation Phase

When asked about the objective of implementing PM a division-manager explained that the strategic purposes of the implementation were to align the continuous improvement efforts in the various departments. He elaborated on this, stating that most of the departments were partaking in this process, yet no consistent strategy as to what kind of improvements to make excited. When the student researcher asked members of the two departments, on the other hand, conflicting answers were given. One operator from department A gave an extensive

answer that somewhat overlapped the strategic idea presented by the division-manager. However, another operator from department B simply stated that it was being implemented to extract measurements from the bottom of the hierarchy, bottom-up.

During the implementation phase, one of the department's struggles during the implementation phase was to make the operators adept the habit of collecting data. One of the operators in the department addresses this struggle by stating,

> *To get everyone's attention and have them partake [in the data collection] is not always easy. We all work a little bit differently out here. Some of us are used to work like that, whereas others have never done it. Moreover, turning that around takes quite a bit of time* –Operator 1, dep. A.

Learning

In addition to the learning curve for data collection amongst the operators, the middle-manager expressed one of his takeaways from the PM project as follows,

> *... what we are learning by doing this now is that... what you are left with is really. You make a change and then you see if that change was helping, or if the change did not help. And what thought me a lot is that ... okay, what do we need of competence to get this [process] to work?* –MM. dep. A.

Utilization of Performance Management

It is appetent that PM has was regarded as an instrument for making improvements to physical processes within the department. This perception overlaps with the perception that the consultant introduced at the first workshop, by combining PM with the Kaizen boards. The middle-manager explains how the department received help from another department to solve a reoccurring issue based on the data collected from the sixth KPI during the PM project. In this respect, he then expressed,

> *...it [the equipment] works almost too well... however, that is where we are at for now. When we look to the [equipment the sixth KPIs collects data on] we do not have the [issue that we used to have], so that we are no longer deathly afraid of starting it [the equipment after it has been stopped]. We know that it will function just fine, and this [way of working related to the PM is] is the takeaway that we must carry us. And that is the positive outcome from it [the PM process]* –MM. dep A.

However, not all the improvement efforts made on the equipment monitored in the PM project were related to the data collected from the KPIs. An operator from the department stated,

> *We are currently testing [a new effort to tackle the issue with dust that they are having], and we have mounted some equipment [related to this new effort], and we are [now]evaluating it. So, we are taking actions, but that is not related to the actual performance management process. However, if one had used the information form and collected data, [then perhaps] we could say that we have an issue every time we apply [one type of raw material] that has a lot of dust and therefore we must make try to an make effort. Therefore, we must make corrections, so we can link that we now have taken action/made corrections because (Then he gives an example of what it could look like if data had been collected) it has been twelve involuntary stops [on this equipment] the last two weeks due to this dust issue* –Operator 1, dep. A.

Internal Follow-up

Some meetings were held shortly after the initial workshop in October 2017. The agenda for these was to inform the reminding operators of what had happened at the workshop, explain the purpose and how work was meant to be carried out. However, since these early meetings no fixed meetings to discuss the PM process were arranged. When asked if frequent meetings were arranged to discuss PM, an operator replied, *…On performance management? No, we have not gotten around to that just yet* (Operator 1 dep. A). This was later confirmed by the middle-manager that replied the following to the same question, *no, we have not done that [held meetings on a regular basis]. Until now it has been sporadic. We talk a little bit about it when we have CPT meetings on Wednesdays but, that is more… there is no fixed structure to it* (MM. dep A).

When inquiring about the middle-manager's utilization of the PM data, he stated, *No, I am not using the KPIs much as of right now. That is more regarding the BST and the BST coaches down there. But we have not taken it [the KPI data] back to the department and used it activity in daily or weekly [Kaizen] boards meetings yet* (MM dep.A). When an operator from the department was asked about how the middle-manager utilized the KPI he expressed his concern stating,

> *... we probably need a clearer structure and more focus on what we want to get out of it [PM], and inquire about the results and if we are still working on it. That is something management and the middle-manager of the department must do. He [the MM.] must, he must step up and say this is something that we want. That is probably when we will show results* –Operator 1, dep. A.

External Follow-up

When asked anyone outside of the department had been interested in the KPIs the middle-manager said, *No, except for the for one [explains that it is the one that he reports]. We have work in progress regarding it [PM], but as of right now there are not many inquiring about it, no* (MM. dep. A). However, he explained that upper management had inquired about two of the other KPIs indirectly. Recently *department A* had an issue with the equipment which two of the KPIs monitors. The breakdown left department A unable to deliver sufficient amounts of raw materials, and upper-management was curious as to how this had happened.

Completeness

From the *operator's perspective,* the chosen KPIs combined addressed what was relevant in the respective areas. When asking an operator if the KPIs were addressing what is *actually relevant* for the chosen areas he replies,

> *Yes, I actually think so. We might end up changing them at one point when we get further into the process. The most important thing for us is to find some that are closely related to what we work with. So, as of now, yes, I still think these are the right ones for us. I cannot see any other [KPIs] that we should have included* –Operator 1, dep. A.

Another indication of high completeness related to two of the KPIs appeared when operator expressed the criticality of those indicators, *…these KPIs are so critical that we do not have infinite time to spend on data collection because then the production within the whole plant stops… so we have to fix it because of the criticality of the equipment* (Operator 1, dep. A).

The *middle-manager*, on the other hand, gave mixed signals on his perception of completeness. First, the KPI he reports to his superior seems to relevant for him. Furthermore, when asking if he thought the KPIs addressed what is *actually relevant* for these areas he said, *yes, it is … I have become more aware of shortcomings and more able to detect the issue at hand* (MM. dep A). He continued by explaining how the PM data had been used to get external help to solve one of the issues related to the sixth KPI the department had added. Yet, since this early improvement, the interest seems to have dropped. When if he utilized the PM data actively in mid-April, he replied, *no, I have not used it much lately* (MM. dep A). From *upper-management's* perspective only one of six KPIs is being inquired about, thus the completeness seems limited for the remaining five KPIs.

Quality

It seems like the *quality* of the indicator has varied, at least regarding the middle-manager's and the operators' ability to influence the indicators. When asking an operator if he could influence the outcome of the KPIs he took a moment to think and replied, y*es, but only some of them* (Operator 1 dep. A). When asking the middle-manager the same question he partially agreed with the operator, stating, *… yes, because, they… or* affect *them…? They are becoming more aware [of the KPIs]* (MM. dep. A).

When asking the middle-manager if he could determine if the operators had done a good job or not based on the outcome of the KPIs he replied, *yes, now I can. I can tell just by looking at the history of the amount of raw material we have applied. I do not need to inquire about this. It is plotted in a table* – MM. dep A. However, this is only for one of the six indicators. During the interview with the operator, it seemed clear that operators had limited influence on the remainder of the KPIs. For instance, when discussing the operator's ability to influence two of the other KPIs he said, *regarding these two, yes … yes somewhat but not as easily [as the other KPI]* (Operator 1, dep. A).

Revision

When debating KPI revision, it was apparent that the department had not yet deemed this necessary. When asking of any prior KPI revisions, an operator replied,

> *No, not yet. We are still in the very early stages when it comes to implementation of [PM] and using it. Everyone is not yet on-board. So, it is more important to get everyone on board first. Make sure everyone is collection the data before we start revising them. If we start changing it before everyone has adapted to this way of working, it will fail and we will lose everything! So, if we can get everyone to collect data, and everyone to use it, that would be the first step in the right direction. That is much more important than changing them as of right now. It is too early to make alterations –Operator 1, dep. A.*

The middle manager further stated, i*t will be relevant, but only the day when the system is working well* (MM. dep. A). However, the department appeared open to future revisions of the KPIs as an operator said, *I do not think that these [KPIs] are set in stone.* –Operator 1, dep. A. In a later interview he stated, *… I do not know if the indicators that we have chosen are the "right ones" or not, but at least we are collecting some data on the topics, so we have some facts on the table* (Operator 1, dep. A).

The Performance Management Process in the eyes of the Middle-Manager

The middle-manager fund the PM useful as it enhanced his understanding of the processes saying, *… as of now it [PM] generates more work. However, it also makes me more aware of the cause of the problem* (MM. dep. A). The middle-manager also highlighted the drastic change in mindset the PM process had brought to the department. He emphasized on how his operators went from performing work operations strictly based on fixed routines, to now experiment with the equipment, testing the actual limits of the equipment. In this respect, he said, *…but what you get with PM is a different mindset. Previously we performed a work operation [refers to an operation on of the KPI measures] only because you were supposed to* (MM. dep A).

Finally, when asked if he would have rejoined the project if he were to choose all over, he replied,

Yes, I would probably have done that, because you learn from it. But, it also takes a little bit of time. And it has been a little bit like this in the department where 'suddenly all of the operators are gone', and then they return, and you try to summarize [how things have been going] this here together [with them] (Changes the topic as he is reflecting) ... But you learn from it, and yes probably done that [joined the project once more] yes –MM. dep. A.

5.2 Department B

The Individual Traits of Department B

This department sits towards the middle of the chain of processes at the plant and have four sub-sections and managed by ten operators. Comparable to department A, department B's operators also have an internal weekly work-rotation between the sub-sections. One of the main functions of this department is to separate certain compounds from the final product through several process steps.

The Data Collection Process

During the workshop in October of 2017, three problematic areas were chosen. However, the department chose only one KPI to focus on, which is measuring the pressure-drop across a valve. This pressure-drop directly affects the *production* capabilities and the *quality* of the product. The KPI itself had a defined span of which the pressure-drop was desired. Furthermore, it was divided into four sub-indicators that all impact the pressure-drop. The data collection for this KPI is twofold. Two of the measurements are based live data from the *technical control system* of the plant. The remaining indicators are collected through manual readings by the operator in the area at the beginning and the end of the workday, Monday to Friday. This work-practice had now been adopted by all the department's operators.

The Design Phase

One of the major challenges for the department during the design phase was to determine in what areas of the sub-departments they would KPIs. Although a division-manager and the consultant assisted the department during the selection process of the problematic areas, an operator expressed that he felt rushed during the first workshop,

> *Yes, it was supposed to happen so incredibly fast. We were in the cafeteria that day you know, and when we got back down [to the room where the workshop was held] we were running out of time. (He then imitates the consultant) Yes, yes, yes you must just… (Then make a gesture, whistling and snaps his fingers) So, we found three [problematic areas], and we have started to make good progress on one of those* –Operator 1, dep. B.

After the workshop, no further directions have been given the department. Although the department had the freedom to choose KPIs as they pleased, the department itself had some

internal criteria in the development process. The middle-manager stated, *Yes, we did [have the freedom to choose for KPIs freely]. Yet, we aimed a little towards what we have working with previously. That is something which is important for both quality and production* (MM. dep. B).

During the design phase, the department decided against what had been planned during the initial workshop and chose to develop only one KPI. The justification for this was to focus all attention one KPI, instead of being spread thin between several. An operator elaborated on this decision, *it is important to take it slow in the beginning, and not to give the operators too much to from the get-go. Then nothing [good] will come out of it, unfortunately. Start out slow so people [the remainder of the operators] understand why [they are doing this] and the goals [of the process]* (Operator 1, dep. B). This aligned well with the explanation the middle-manager gave, i*t was because we wanted to able follow-up on it properly. We would instead do one properly and learn from it, instead of doing something halfway. Because we have a lot of other things that we are doing [besides the PM pilot project] also* (MM. dep. B).

Involvement

Along with the middle-manager, six of the ten operators partook in the development of the KPI. Thus, most of the department was involved in the *design phase*. However, the chosen KPI appears to be quite relevant for the 24/7 shifts who runs the production process at the plant. When asked how this indicator relevant to the shift department one of the shifts middle-managers replied,

> *Well, the operators in department B are here for seven and a half hours [a day], whereas we are here 24 hours a day. Not necessarily the same shift, there is new one [shift that comes] on in the afternoon and another one for the night, but the process is running continuously. So, for us to deliver a high-quality product from that department, it is important for us that we have a desired pressure-drop here* –MM. 24/7 shift.

Yet, when asked they had been involved in the development process the middle-manager replied, *... that [the design process] is not something we have been involved with no, even though that number [pressure drop] is just as important for us* (MM. 24/7 shift).

However, it seems like the department would prefer to keep the *design process* local within the department. When asked if it would have been natural to include the 24/7 shift in the design process, an operator from department B replied,

> *It would probably be nice to get some input as they probably see things a little bit different than we do. However, I believe that we know the facility best in a way, how things look both on the inside and the outside ["the inside" refers to the user interface to the technical control system, and "the outside" refers to what the actual physical facility looks like]. We are the ones that do most of the corrections* –Operator 1, dep. B.

When the middle-manager of department B was asked the same question he replied,

> *It would have… Not in the development process, but we should have included them more in the sense that we now have developed a KPI and we are dependent upon them to keep it [within the desirable limits] … It is so that the shift operators that the [24/7 shift] middle-manager manages are running the process, and what they are doing affects the processes [in department B]. We [department B] are only ones correcting the occurring issues. So, they [the 24/7 shift] can choose to run the process outside the desired area for several work-shifts really, without having a relation [a weighted opinion as to what the pressure-drop should be and why it is important] to it [the pressure fall]. So, we should have to include them more actively than what we have done and tell them that we now have made a PM KPI and we are dependent upon you to help us hold it [within our set limits]* –MM. dep B.

When asked if he would consider including the 24/7 shift in future, he confirmed this indirectly as he recognized the strength of the cross-disciplinary teams, saying *I think we have to use the CPT more actively* (MM. dep B).

The Implementation – KPI

Shortly after the initial workshop in October 2017, the middle-manager of department B took time out of his regular meetings with his operators to announce the what had happened during the workshop. During an interview, he stressed the importance of this since only three of the operators had been present at the workshop, and they held information the remainder of operators in the department did not possess. During these meetings, the manager expressed his

assumptions about the implementation process of performance management was likely to result in more work for the department, yet he underlined why it was important.

Two operators from the department confirmed that the PM process had generated extra work. When asking one of them on the effect on workload, he said, No, it has generated more [work]. Now we must out [into the vicinity] twice a day to conduct these measurements to consider how the plant is doing regarding the performance management (Operator 1, dep. B).

An operator implied that the extra workload had caused some frustration among some operators, but the department eventually accepted the transition and are now persistently collecting data. He expressed the following,

> *Perhaps in the beginning people perceived it [the data collection]as more of a hassle, (Imitates some operators perception on the PM process in the early stages) "urgh, now I have to go out and look at the facility again…" However, now I think that it has become such an incorporated habit that it almost becomes more like a routine* –Operator 1, dep. B.

However, the implementation appears to be rather forceful, and the relevance not yet entirely understood by many of the operators in the department. A second operator stated the following,

> *People [operators] are registering [data to the KPI] because they have to you know and try to do corrections and such but… they do it because they have to do it. I do not think that they understand the term and why they do it and what it entails. It must be done so they do it, right?* –Operator 2, dep. B.

For some of the operators, the implementation led to additional work as they had to teach their colleagues how to perform the data collection process. However, this was primarily in the early stages of the implementation phase.

From the middle-manager's perspective however, the implementation phase had appeared to be smooth. He expressed his assumption of the workload for the operators and his perception of the operators experience of the PM process saying, *More work. More work for them [the operators in department B]. However, there has not been anything negative [expressed vocally] related to it* (MM. dep B).

While department B had not been too fond of the thought of including the 24/7 shift during the design phase, the attitude was quite adverse during the implementation phase. An operator expressed the importance of collaboration with the 24/7 shift where they would take interest in their KPI, stating,

> *Yes, that is crucial. They are the ones that are running the plant and can therefore influence the pressure-drop quite a lot from the control room, and it is important that they become familiar with what is the desired area [for the KPI] so they can do their part to stay within what we have chosen [as the desired area]. That could mean regulate the operating-speed of some pumps… (stops his trail of thoughts)* –Operator 1, dep. B.

An attempt had therefore been made to get the 24/7 shift to use the KPI developed by the department. Upper-management had also been involved in this process of guiding shift's attention towards the KPI,

> *Our department-manager sent an email to the shift operators, asking for their help to stay on the marks [within the desired span for the KPI]. They have a production schedule that they follow. However, if they have updated that [the production schedule] and [if they] are paying attention to all the measurements now? I do not know…* –Operator 1, dep. B.

Learning

Already early in the development process department B's middle-manager made the final call, choosing to focus on only one KPI instead of making several as settled for during the initial workshop. This decision was largely based on the belief of successful implementation of PM required group effort where everyone has acknowledged the concept. Thus, giving the operators time to learn and feel comfortable is vital. An operator from the department strongly supported this decision, stating,

> *Yes, people [the operators] need time to learn this, right? If this [the implementation of performance management] is to succeed, we must have time to carry out it out [try it], learn, and understand it [the PM process]. Yes, not just keep pouring on [keep adding more and more to the concept]* –Operator 1, dep. B.

Beyond the learning related to PM process itself, many of the operators had also developed a greater understanding of the technical features of the production equipment. The middle-manager said,

> *I can tell that it [the PM process] has engaged operators that previously have not been seeking process data from our technical control system to actively examine the state of the production process, thus examining the conditions of the equipment that we have chosen to focus on in the PM process. And that is positive to me, to see that the operators are getting more engaged in their work –MM. dep B.*

Utilization of Performance Management

Since the implementation of PM, drastic changes in how the department operates has occurred. The operators understanding of the department's internal processes was enhanced, and awareness of the pressure-drop had risen. Instead of performing work operations as part of a weekly routine, the operators have now taken a *proactive* approach to their work, and the workday for the operator largely depends on the state if the KPI. Thus, it is apparent that PM has been utilized like a control system in department B. For instance, the structure of the operator's workday is largely dependent on the result of the data collected and examined first thing in the morning. Consequently, a process that once was regarded as a *bottle-neck* is now a process with overcapacity.

When discussing the future of the PM process in the department it was apparent that the middle-manager stuck to the initial idea of mastering one before adding additional KPIs, stating, *I believe that we must dig deeper into the KPI that we have chosen, to the causes to more actively prevent that we move outside the desired limits* (MM. dep B).

However, for future KPI development focus might shift away from this control approach in favor of the continuous improvement work combining the PM process with the Kaizen boards. The in this regard middle manager expresses, *for me [in my opinion] the link between what we talked about, the Kaizen board and regular board meetings [regarding the PM process]. There should be an obvious connection [between that and] this equipment* (MM. dep B).

Internal Follow-up

Although the department only chose one KPI to make the follow-up process more convenient, the follow-up has been rather moderate. After the initial meetings where the middle-manager introduced the concept to the department, no regular meetings have been held. Furthermore, neither the middle-manager himself nor the division-manager is actively seeking the data generated from the performance management process. An operator from the department expressed his concern regarding his superior's follow-up, stating,

> *Interviewee: They could probably have been better at that. Interviewer: So, there is no one who inquired about it? Interviewee: No, it's been pretty dead now for a while now, it has. So that is how it often goes. They have a lot on their plate too, but it is important that they ask about it to show that this is important. If they don't inquire it slips* –Operator 1, dep. B.

Yet, he emphasizes that the middle-manager is aware of this, saying, *But, he [the middle-manager] is aware that perhaps we should have a meeting or something… [something] to follow-up up on it a little bit* (Operator 1, dep. B).

The inadequacy of follow-up on the process was later confirmed by the middle-manager. When asked if the department had held any meetings on the topic since the first interview with the middle-manager weeks earlier, he replied,

> Interviewee: *No, it is [just] that. I have not had time to inquire, it has not been important enough. It [the performance management process] has worked. One can see that the equipment is being maintained. But one should have definitely done that [inquired].*
>
> Interviewer: *Roughly speaking, how many times a week or month do you genuinely think that you are following-up on the process?*
>
> Interviewer: *I have dialogues each week, a two the three times per week because the operators are informing me that "now this and that has happened" because they are paying attention and then they inform me about it too.*
>
> Interviewer: *But they are approaching you more than you are approaching them?*
>
> Interviewee: *Yes, yes. So that is a positive thing* –MM. dep. B.

Even though the middle-manager did not directly inquire about the KPI, he was still quite concerned with the measurement value of pressure-drop across the valve. During an interview the middle-manager pulled up the user interphase from the technical control system and said, *Both the division-manager and myself are looking through these images daily, and this (pointing to a valve) is one of the most important ones that [we] always look at. This is the one that we have a KPI on. So that is a natural topic for us to discuss* (MM. dep. B). He then concludes a discussion on the topic saying, *So, yes, it [the KPI] is being asked for, but not directly if we are above or below the performance management [KPI]; but more so if we are on our marks in comparison to the production schedule* (MM. dep. B).

External Follow-up

Comparable to the middle-manager, the division-manager of department B did not actively inquire about KPI related to the PM process directly. However, he is certainly concerned about the production process and related measurement data. When addressing the topic, the middle-manager said,

...He [the division-manager] is interested in the measurement values on the equipment too, and he checks in on the production daily. However, as long as we are somewhat close to the desired value ... if the pressure-drop is too high or too low he has commented on it. As long as we are on point he says nothing –MM. dep B.

Completeness

Several assertions support a high degree of completeness of the indicator of department B. Both operators from the department, as well as the middle-manager, expressed on several occasions that the indicator addressed the real issue in its area. Although neither the middle-manager nor the department-manager queried about the KPI, directly the measurement seems relevant for both, as they both controlled the live measurements of the KPI daily.

Another indication of completeness from the perspective of the operators is how the KPI could dictate the work in the department. An operator stated the following,

... in the morning they go out, conduct the measurements and register what they found, and then rest they day [work] is then based upon that, right? Because if you are far from the desired area [for pressure-drop], perhaps there is a pump needs to be washed. And the day is then directed by that, if you must make corrections –Operator 1, dep. B.

He continues, *if the pressure-drop is "good" we do not do too much really. Things are working as they should. However, as soon as it starts to drop, or something happens we must act* (Operator 1, dep. B).

However, it is evident not all relevant issues were addressed by KPI. The middle-manager expressed the following in this regard,

But there are things [regarding the KPI] that we cannot influence. We can be outside the desired area [for pressure-drop] even though the operators have done everything they can [to influence the KPI], because the production [plan] might be different from normal. But at least we know that our is equipment optimal. We have done what we can. Now there are other reasons [for being outside the desired area] that we cannot influence –MM. dep B.

However, he confirms that he could find measurements of these influencers elsewhere in the technical control system.

Quality

The quality of the KPI seems to have been rather high, as the operators could influence the KPI directly through their actions. When the middle-manager was asked if he could tell the operator working in the area had done a decent job simply by looking at the KPI, he took a moment to think and said,

> *Interviewee: Yes, you could see that. One can do that…*
> *Interviewer: How can you tell?*
> *Interviewee: We have a set limit for where we would like to be, and we also have registration on what the operator has done* –MM. dep B.

However, as addressed prior there are factors that the operator cannot influence, which negatively influences the quality of the indicator accordingly.

Revision

By the time of the first interview, department B had already revised their KPI as they had chosen their initial span for the desired pressure drop too narrow. Another issue with the prior design was the layout. Previously, the span was divided into three colors zones, green, yellow, and red. Green meant that everything was okay, yellow meant that the pressure drop was moving away from the desired value, and red meant the pressure drop was undesirable. The problem with this was the lack of clear directions. The green and red zones had clear incentives as either the pressure-drop were either "good" or "bad". The yellow zone, on the other hand, gave no clear directions to the operator. To make the system more unambiguous, the span for desirable pressure-drop was increased. Now, only the green zone and the red zone remained. An operator still noted that if one were familiar with the equipment, one could still pay attention to the pressure-drop any being to make corrections as the pressure-drop moved into the "yellow zone" of the initial version. Thus, in a sense, the operator could overrule the formal system.

When asking about further revisions of the KPI, it was clear that the department considered it too early to make further revisions, as the topic was not discussed nor was a revision date scheduled.

The Performance Management Process in the eyes of the Middle-Manager

Since the implementation of performance management, the middle-manager had witnessed a raised interest and awareness among the operators in the department. When asked how the process had impacted his workday as a middle-manager he said,

> *I see that operators that previously did not use process data previously, the ABB system [the technical control system], now actively use it to see how the production is going, thus how the conditions are regarding the equipment that our PM focuses on. That has given me something positive, as one sees that the operators are getting more engaged. But this is a job that we have done previously too, but the operators are more aware of this now, instead of me having to tell them [to do this work]. Now they see it themselves. They are merely more engaged. They have become more self-going.*
> –MM. dep. B.

The middle-manager's perception of PM has also changed during the project period. When asked if PM process had unfolded as he initially anticipated he said, *Yes, I would say so. I am more positive now that when we stated, due to the much more engaged operators we have compared to earlier* (MM. dep. B). His positive outlook on the process was confirmed when he was asked if he would have rejoined the project if he were to choose again, stating, *Yes, I think so. It is useful experience for oneself, and it is great for engaging the operators with something that gives a heightened interest in what we are working with* (MM. dep. B).

5.3 An External Perspective – The Consultant

To get an outsiders perspective on the case the consultant that lead both workshops were interviewed. He was pleased with the initiation of the bottom-up phase, but expressed great concern about management's role in the project,

> *Yes, but I think that it started out well. The subordinates were engaged and really wanted to participate [in the PM process]. I think management has been too passive in between the first and the second time I visited. By that, I mean that I do not think that management has conveyed it, worked with it and supported it [the PM process]. This is to say that management has been too passive. By that, I mean that they should be more active in the process. It is crucial that PM is not something being implemented for the department-manager of the BST or the BST itself. No, the local management and its operators should be the ones that feel ownership of the performance management process. Moreover, if they do not realize that responsibility, then we have a problem* –Consultant.

The consultant explicitly stated that his job had only been to facilitate the process, as the departments themselves knew their processes in detail. When asked if he believed the departments had chosen "good" indicators he replied,

> *Yes, to some degree. Well, this is where if I personally had great knowledge of the process, if I had been [out in the department, been in out in the field] and analyzed their processes first, then I would be more able to say that this right here is where I think you should select some KPIs because it is here where I think you will have a greater degree of success. But that is not what we chose to do, that I should analyze the processes. So, I must assume that they know this. I actually have difficulties to say [anything about] if they [the KPIs] are good or bad. I can only confirm if they [the departments] think they are good or bad and if they find these interesting to work with* –Consultant.

When asking of his perception on different approaches to both the design phase and implementation of PM, he stated,

> *For me the most important thing is that they find something that they are interested in. If that is six, or two, or one, that is indifferent to me now in the beginning. Now we are trying to create a feeling of success, and then I would prefer to have two good ones instead of six 'half-bad' ones that they do not use for anything. So, I am more looking to see if they are satisfied, if they find them interesting, and if they think they give them an overview, rather than the quantity. So, it is quality over quantity that I prefer*
> –Consultant.

The consultant had only visited the plant a handful of occasions, yet he expressed great concern about management's involvement. When asked how he thought the middle-managers perceived the PM process he said,

> *…But one of them has not even been involved! The one from department A that is. So that I cannot comment on. But that is what concerns me a little bit. And that is when I say, when I look to department A I think there is too much passiveness. And that is why the leaders should be worked on [focused on/coursed], so that they understand these things, and especially the middle-managers. But it is not more classroom education they need. It is more about coaching in the field while it happens. Coaching them in real life situations with their own tasks instead of giving them more examples*
> –Consultant.

When asked if he personally thought the pilot project would succeed, he insisted that he did. Yet, he stressed the would require management to actively partake and become more engaged in the project. Furthermore, he emphasized that implementation of PM is a complex process and organizations need time to adept; and from his experience implementation of PM in organizations like this one takes at least one to two years.

6.0 Discussion

6.1 The Traits of the Departments

Department A and department B have some striking similarities. Both are responsible for several production areas and have approximately the same number of operators. They both have an internal rotation plan regarding the work tasks within the department, where operators relocate and perform new tasks from week to week. Furthermore, they are both responsible for the maintenance in their department and their production equipment, as neither control the actual production process.

However, there are vast contrasts between the organizational traits of the two departments, described by Neely et al. (1995) as the *internal environment.* Department A has reoccurring irregularities in the work schedule, due to the incoming shipments with raw materials. According to the middle-manager of the department, these rapid changes made his duties more challenging. For instance, he highlights the struggle of keeping his operators informed as, *suddenly all the operators are gone, and then they return, and you must summarize [how things have been going] this here together [with the operators]* (MM. dep. A), before returning later. The internal environment of department B, on the contrary, appears to be rather stable, primarily influenced by the production schedule that the 24/7 shift follows.

6.2 Data Collection for Performance Management Development

Department *A* chose to develop six KPIs, one up from the original five. By doing this the department would still focus on all the initial problematic areas, while addressing an additional reoccurring issue. Department *B,* on the other hand, chose to focus on only one indicator. It is important to note that department B's indicator seemed more complex than any of the single KPIs of department A; as it depended on several sub-indicators that both relied on measurements collected by operators as well as live data from the technical control system.

Each department chose different strategic paths in the selection process of KPIs. However, as addressed by the *contingency theory,* every organization is unique and no universal rules exist as to how one should collect management accounting data (Otley, 1980). Further, as management accounting practices should be tailored to fit the environment that it operates within (McWatters et al., 2008), these strategic differences on its own should not raise major concern.

However, for department A there was an apparent misfit between the initial goal and the actual outcome. An ambitious goal was chosen, even though many of the operators were unfamiliar with these work procedures. Hence, only one indicator was registered throughout the period, whereas the data collection of the remaining five was either short-lived or never initiated. For department *B* on the other hand, the situation was different. The middle-manager realized that not all his operators were equally familiar with such practices of data collection for PM. Therefore, he decided to lower the bar and by focus on only one KPI during the initial phase of the project. Yet, this approach was quite successful regarding data collection and utilization of the measurements, as all operators are now collecting measurement data twice a day. Department B's strategy is closely aligned with the consultant's preference - *one or two good* KPIs instead of selecting a greater number of indicators that are not used.

6.3 The Design Phase

The objective of the top-down phase was to let upper-management select the strategic directions for the plant and communicate these to the respective departments. This is a crucial part of the development phase, as the organization communicates its strategy through the chosen goals and measurements (Lohman et al., 2004). An early attempt to merge upper-management's strategic direction with the KPI development of the two departments occurred during the initial workshop in October 2017. Here, both a division-manager and the consultant actively partook in discussions during the selection process of troublesome areas within each department.

However, after the workshop no further incentives were given from upper-management for several months. Even though the two departments were given the freedom to select and develop the KPIs they desired, little to no acts of *self-interest seeking* (Eisenhardt, 1989) behavior has been found by the student researcher. Rather, each department had several internal criteria in the selection process to make sure the KPIs addressed what was truly relevant for issues the departments were struggling with.

Finally, in April of 2018 another attempt was made to further align the strategic directions given by upper-management with the KPIs that the two departments had designed. During the second workshop the consultant asked the two departments to place their chosen KPIs within the following five categories: *safety*, *coworkers*, *quality*, *production*, and *cost*. The consultant never explicitly stated this, those were the categories that upper-management had selected during the top-down phase of the project.

Involvement

The degree of influence the departments have had during both the design phase and the implementation phase of the KPIs was significant. Ever since the initiation phase, where troublesome areas of each department were identified, both had fully managed their own development phase. If we in this context, regard the middle-manager and the operators as the *subordinates*, and upper-management as *managers,* the sixth level of influence would be a close resemblance level of influence the departments have had in the process. Dachler and Wilpert (1978) state, *(6) The decision is completely in the hands of organization members, with no distinction between managers and subordinates* (p.14).

Although the 24/7 shift is running the production process of both departments, neither chose to involve the shift departments in the design phase of the KPIs. When a middle-manager for

one of the shifts was asked about their involvement in department A, he confirmed that the shift had not been involved in the design process. Perhaps more worrying however was the fact that he was not aware of which KPIs had been chosen. Nevertheless, when asked if it would be relevant to include the shift in future KPI design both the middle-manager and an operator from department A welcomed the idea.

The middle-manager of one of the shifts could also confirm that they had not been involved in the design process of the KPI in department B. However, he was aware of their KPI and emphasized it was just as relevant for the shift department as it was for department B itself. When the middle-manager and an operator from department B were asked if they thought it would have been useful to include the 24/7 shift in the design phase, both admitted that some input might have been useful. However, they clearly expressed that this was their KPI and they wanted the final say as it was department B who made all corrections to the equipment when the pressure-drop was undesirable.

Department B was very aware of 24/7 shifts influence on the KPI and seemed quite eager to have the 24/7 shifts adopting the KPI as one of their own. Thus, if we in this context consider the 24/7 shifts as the *subordinates* and department *managers*, shift had the impact on the process resemblances level of influence where*, (1) No (advance) information is given to employees about a decision to be taken* (Dachler & Wilpert, 1978, p. 14). For future development on the other hand, both department A and department B seemed rather open to include the 24/7 shifts, either directly or through the critical process team.

6.4 Implementation

Based on the different perceptions as to why the plant decided to initiate the project, it is apparent that the *vision and mission* as described by (Ferreira & Otley, 2009), has not been equally understood when communicated during the deployment phase, similar to the concept of *Figure 2*. This could have influenced both the design and the implantation phase of the project. As debated in the data collection section above, department A and department B had very different approaches to data collection. Department A developed more indicators but struggled during the implementation phase as very little data was collected. Department B only developed one indicator, yet the data collection was persistent throughout the period.

In the early stages of the implementation phase in department B it was apparent that not all operators ware equally impressed with the new KPI, as it resulted in more work. In a sense it seems like this was perceived as a *bad rule* in accordance with Richard E. Walton's words, in the framework of Adler and Borys (1996). However, this perception seems to have changed as the operators have adopted the habit and become self-going. They actively use process data and the understanding of the processes within this production section is greatly enhanced. This is practically the definition of *internal transparency* in the framework of Adler and Borys (1996).

The middle-manager of department A embraced the performance management process in the sense that he was able to better understand the cause of some of the issues that the department had. Comparable to department B, the performance management process resulted in a greater *internal transparency* (Adler & Borys, 1996), at least for the middle-manager. No direct findings were made regarding the operators' perception of the data collection being perceived as either *good* or *bad* rules. However, we know that both the middle-manager and an operator described the process as more work intensive. Further, the data collection period was rather limited. Thus, it is evident that operators did not perceive the implementation of the PMS as a *good rule*.

Follow-up

Both departments had early meetings shortly after the workshop in October 2017. However, neither had established fixed meetings to discuss what progress the PM project had made. Relatively early in the implementation phase, department A had utilized the collected data from one of their KPIs as evidence of their struggles on some specific machinery. With this as a proof the department communicated their needs and received external help to address the

issue. The result of this follow-up process was evident, as the department no longer struggled with this issue thereafter. This example shows that the closed-loop structure, portrayed in *Figure 4*, was working initially. However, both the follow-up process and the data collection related to this indicator vanished soon thereafter. A second indicator caught the attention of the middle-manager, as this was specifically asked for by his superior. For the remaining KPIs, the follow-up process and eventually the data collection had either failed or never begun.

For department B on the other hand, the only one to actively use KPI data was the operators. Even though management did not seek this KPI directly, both the middle-manager and the division-manager of the department closely monitored the pressure-drop the KPI displayed. Further, the middle-manager engaged in discussions regarding the KPI on a weekly basis as, operators requested his advice. Thus, an indirect follow-up existed, but not directly related to the KPI that the operators are collecting data for.

Conclusively, the deployment phase of the structure with the forward phase of the closed-loop system in *Figure 4* seem to have been partially successful. It appears that department A had grasped the *vision* and *mission* of the initial process (Bititci et al., 1997). Perhaps this could explain the early success when the middle-manager effectivity utilized the feedback-loop, communicating the department's needs to further receive assistance. Yet, ever after the early success the desired structure in *Figure 4* has collapsed, as both the follow-up process and data collection gradually has faded away. For department B on the other hand it seems like deployment phase was less successful in conveying the *vision* and *mission* of the process (Bititci et al., 1997). Yet, regarding the feedback-loop between the arenas, department B's follow-up has been more persistent even though the follow-up has been indirect. Thus, the desired closed-loop structure portrayed in *Figure 4* has been implemented somewhat successfully.

Thus, both departments have had struggles with establishing the closed-loop purposed by (Bititci et al., 1997), *Figure 2*. When the both or either the deployment or the feedback portion of the closed-loop process does not function properly, a PMS cannot operate as the *nervous system* of the organization as described by Ferreira and Otley (2009).

6.5 Quality

As outlined in *Chapter 2.5.3* the quality of an indicator is determined by three following factors: *(1) sensitivity*, *(2) precision*, and *(3) verifiability*. When addressing *sensitivity*, both an operator and the middle-manager of department *A* stated that the operators could only influence some of the KPIs to a significant degree. Thus, the KPIs appears to be only somewhat sensitive. For department *B* on the other hand, the KPI seems rather sensitive. Despite the external factor that the department could not influence, both the middle-manager and an operator suggested that an operator could greatly influence the outcome of the KPI.

In terms of *precision*, all the chosen KPIs seems rather good as all indicators could either be counted or compared to a desired limit. Finally, the data collected in department A was mostly generated from the operators registered into the data sheets. Thus, it could prove difficult to verify this data at a later state. Similarly, for department B, three of the indicators are registered into the spreadsheet by an operator. However, the fourth indicator and the actual KPI is retrieved directly as live data from the technical control system. Here, data is accessible at least 90 days, which indicates that the verifiability of department B's indicator is better than the KPIs of department A.

Consequently, the quality of department B's KPI seems to be higher than the KPIs of department A. Since both departments have developed their own KPIs, it is difficult to verify to what extent *employee participation* in the development phase leads to higher quality indictors (Groen et al., 2017). However, the quality both departments seems to be relatively high.

When comparing the KPIs to Armstrong's (2006) criteria for selection of *appropriate performance measures*, it appears like most have been met. Even though it was not the focus of the departments during the development phase, all the KPIs align with at least one of the five strategic directions given by management. As already discussed, the level of *precision* seems rather high and some of the KPIs are fairly *verifiability*. Furthermore, operators and the middle-manager from both departments all believed that the KPIs addressed what was relevant within the areas they had been chosen. Thus, it seems like the KPIs are comprehensive. Moreover, to address the objectives of every individual in the department could be difficult, but it is reasonable to assume that the KPI(s) at least are relevant for the objectives of the department (the team).

Furthermore, it seems like the KPIs are clearly defined, verifiable, and precise. Finally, it seems like the KPI(s) from the operator's perspective are *comprehensive* as the KPIs addresses what is most relevant in the department. Thus, the *key features* are being addressed. However, it does not seem like this translates to upper-management.

6.6 Completeness

One of the operators in department *A* claimed that the chosen KPIs were addressing what is relevant for the operators, thus the KPIs seems to be rather complete. Even though the department got an early win with the system, correcting a reoccurring issue on some of the critical machinery in the department; the data collection ended rather quickly for most of the KPIs. Since the indicators were chosen to aid the operators in the continuous improvement work, one could question the completeness from the *operator's perspective* based on the poor follow-up process. However, this could also indicate that the operators have not understood the purpose of the data collection as a tool in the continuous improvement process. A third explanation could simply be that the operators have so much work to do, that anything that does not directly influence the production in the short run is not being prioritized. So far, no attempts nor plans had been laid for revision of the KPIs. Thus, it is difficult to determine degree of incompleteness, in a span of *broad* to *narrow* (Jordan & Messner, 2012).

For *upper-management* in department A these KPIs seems to be rather incomplete, as only one of the six indicators are being utilized. There could be a plethora of explanations for this incompleteness. However, all six indicators are *specific performance measurements* provide detailed information on a limited number of processes. For upper-management *aggregate performance measurements* that provide information a broad number of actions could be more relevant, as many of the operational details is somewhat irrelevant for them.

There are several factors that could influence the completeness of department B's KPI. From the *operator's* perspective, the value of KPI can largely shape the workday. If the measurement value is within desirable limits no immediate actions are taken. If the value is outside the desired limits on the other hand, the operator makes corrections based on the values of the sub-indicators, attempting to bring the value of the KPI back to a desirable state. Thus, the completeness of the KPI seems to be rather high. Another indication of a high degree of completeness in the KPI was the early design revisions that were made. In the framework of Adler and Borys (1996) this could be regarded as *repair*, which is a correction only applicable to an indicator with a *narrow degree* of incompleteness (Jordan & Messner, 2012). Based on this the chosen KPI seems rather complete. Yet, as the pinpointed by middle-manager there are certain factors outside the jurisdiction of department B that may influence the KPI. The middle-manager confirmed that he could find measurements for this within the technical control system. However, for the individual operator without the same level of

internal transparency, (Adler & Borys, 1996), as the middle-managers this information was harder to access.

From the perspective of the *middle-manager* the KPI is addressing an issue that he previously had to manage. Previously he had to instruct the operators on what actions were needed and when to act. However, this was no longer necessary as the operators had become *self-going*, taking initiative themselves when needed. Thus, the completeness would be high if the work conditions had remained static. The indicator is now incomplete for the middle manager in the sense that it provides too much irrelevant information, as the chosen KPI is a *specific performance measurement* that provides detailed information on a subset of actions. Yet, the middle-manager is searching for *aggregate performance measures* shows the bigger picture, with less specific information on sub-process (Moers, 2006). Consequently, the middle-manager simply retrieves this information from the technical control system. Similarly, it would be natural for the *division-manager* seek *aggregate measurements*, as the bigger picture becomes increasingly relevant as one move upwards in the hierarchy. This is likely one of the reasons to why he is not asking for the specific KPI.

Based on the discussion above it is apparent that neither departments have complete KPI(s). Yet, based on utilization, continuous data collection, and the ability to repair the indicator as a shortcoming was reviled, department B's KPI seem to hold a much higher degree of completeness from an *operator's* perspective than the indicators of department A. From the perspective of *upper-management* on the other hand, both departments seem to have selected indicators with a significant degree of incompletes. This is due to specificity of the measurements, providing detailed information on a very limited number of subprocesses. For upper-management who is responsible for several sub-departments, such levels of detail could be counterproductive. Not only could such information be difficult to interpret without significant process knowledge. Too many indicators could mean that vital information disappears, as the essential information may become harder to track amongst the less relevant indicators. Consequently, it may not only provide little aid in *the decision-making process*, it could lead the attention away from what is relevant for management. Thus, perhaps one could suggest that middle-managements role could be to only forward information that is strictly relevant for upper-management. Perhaps then the feedback-loops in *Figure 4* would function.

6.7 The Middle-Managers Perception of the Performance Management Process

Even though it has generated additional work, the middle-manager from both departments seemed quite positive to the performance management process in their department. The middle-manager in department A had bettered his own *internal transparency* (Adler & Borys, 1996), whereas the middle-manager in department B had witnessed the same amongst his operators.

When asked if they would have rejoined the project, the answers were surprisingly similar. Both managers said that they believe that they would have rejoined the project. Department A's middle-manager focused on the benefits regarding learning, and department B's middle-manager focused on the benefits of experience and how the operators had gotten more actively engaged. Conclusively, both departments has *a leadership that reinforces learning*, which is regarded the *third building block* in the framework of (Garvin et al., 2008). This curtail, as any organizational that wants to remain competitive in the future should be a learning organization (Garvin et al., 2008).

6.8 Enabling or Coercive Control

Based on the statement of operator 2 alone, it appears that the implementation of PM initially was regarded by the operators as a "bad rule" in department B. However, it seems like this perception has changed throughout the project. Furthermore, it seems like the PM system of department B at least addresses at least three of the four criteria for an enabling system. *Repair* was demonstrated as the initial span of the desired pressure-drop was altered. Furthermore, the implementation of PM had led to heighten *internal transparency* for the operators, as they now actively gathered process data, evaluated it, and acted accordingly based on the outcome. *Flexibility* was also highlighted as an operator explained how he could overrule the system, making corrections to enhance the pressure-drop before the system indicated that the pressure-drop was undesirable. Thus, for department B it seems like the system leaves room for user improvements when shortcomings are revealed. Hence, we can regard this an *enabling system* with respect to the framework of Adler and Borys (1996).

If we compare the same four criteria with the findings for department A, it is challenging to determine if the implementation of PM would be regarded a bad rule or not. When addressing *repair*, the department expressed that it was too early for revisions of the KPIs. Thus, it is hard to tell if any potential incompleteness in the KPIs could have been *repaired* or not. *Flexibility* is also hard to discuss as the PM data form this department has been meant utilized for improvement work and cannot the *overruled* in the same sense as the "control system" of department B's system. Regarding the *internal transparency*, the middle-manager himself explained how the PM process had enhanced his ability to see the actual cause of the problem. Thus, for him, the internal processes had become more transparent. As of *global transparency*, no direct relation was found to the PM process.

Because of the lacking utilization of the PM it could be difficult to determine if the system would be regarded as enabling, based only on those criteria for an enabling system. Yet, if we compare this to how Adler and Borys (1996), regard a coercive system, *they are a substitute for, rather than a complement to commitment* (p.69), one could argue that the lack of commitment to data collection would classify department A's PMS as *coercive*.

7.0 Conclusion

When debating the data collection for Performance Management (PM), it is important to keep the differences in the *internal environment* in mind. Department B had rather stable work conditions, whereas department A had quite a turbulent internal environment. Thus, differences in accounting practices are somewhat expected. More surprising however, is that department B, the more stable department, was the one to protest against the ambitious introduction of five KPIs. Instead of five, department B focused on only one KPI. In comparison, even with most of the operators being unfamiliar with data collection practices, department A chose to add a KPI instead of lowering the bar like department B. Initially department A's approach led to vital improvements at the early stages of the implementation process, but the success was short-lived. The data collection related to five of the six indicators were either brief or failed to occur. Department B on the contrary, whom chose to concentrate only on one KPI, was extremely successful -in the sense that all the operators had adapted to this new routine. Consequently, the Project Management System (PMS) of department B could be described as an *enabling* system, whereas department A's PMS would be characterized as a *coercive* system.

During the *design phase,* both departments selected the KPIs they found advantageous. Despite the tightknit dependency on the 24/7 shift, neither department requested their input during the design stage of the KPI(s). However, department B was eager to involve the shift department at the *implementation stage*, as both the division-manager and the middle-manager of department B requested that the 24/7 shift adopt their KPI. This engagement was vital, as the shift could greatly influence the pressure-drop, which the KPI was monitoring. By doing so, quality issues of the indicator related both to *sensitivity* and *precision* were being addressed. That being said, the shift could still greatly impact the outcome of the KPI unbeknownst to the operator in department B; which results in the incompleteness of the indicator left untouched. Department A, on the other hand, did not express this sudden interest in including the shift at the implementation stage.

It appears the bottom-up development process has positively influenced the completeness of the KPIs from the perspective of the operators. However, the degree of incompleteness to upper-management has amplified. A commonality for both departments was that upper-management took little interest in most of the KPIs. An explanation for this could be the degree of specificity for the indicators, as management commonly is seeking aggregate accounting data to paint the bigger picture. Yet, when the management is not actively seeking

the measurement data, the feedback-loop in the closed-loop system -where strategic directions can be communicated amidst the process and department needs are communicated back- falls apart. One could argue, a majority of the responsibility rests on the middle-manager as s/he must present the accounting data in a format that is useful for the superiors. However, with only limited input from upper-management, differentiating what is relevant and what is not could prove difficult.

Even though neither of the two middle-managers in the respective departments actively utilized the data generated from the process themselves, they were surprisingly positive to the outcome. Both highlighted the performance management process as a driving force for internal transparency within the department. Furthermore, learning was considered vital for both managers which indicates that the organization has *leadership that reinforces learning*.

If the pilot project will succeed or fail remains unforeseen. The consultant stated that complete implementation of a project like this commonly takes at least one to two years. Though the consultant was rather optimistic regarding the future of the project, he emphasized success relies primarily on management's follow-up efforts.

Key-Takeaways

The findings in this case study suggest that the completeness of KPIs were greatly influenced by the bottom-up development phase. Although the completeness of the indicators is enhanced from the operator's perspective, the benefits of this could be outweighed by management as they feel incompleteness has intensified. Even though the level of detail made the KPIs more applicable for the operators, the KPIs lost relevancy for management, who seeks improved representational qualities of indicators, specifically in search of KPIs reflecting the bigger picture. To make sure benefits of the bottom-up approach are not overthrown, it is essential that middle-management complete the feedback-loop and communicate only what is relevant back to their superiors. Despite their modest utilization of the KPIs, both middle-managers were surprisingly positive to the PM process. Both emphasized the heightened *internal transparency* within the department whilst illuminating the importance of learning.

Limitations

There are also some weaknesses in the validity of the study that should be pointed out. For instance, due to the nature of a single-case qualitative case study, generalization of any findings on their own is merely impossible. Much of the data was collected through

interviews, but only occasionally informal conversations took place between the student researcher outside the interviews; this was hardly enough to judge the interviewee's character. Therefore, it is difficult to determine if the interviewee was overexaggerating or not during the interviews. However, with multiple sources of data, and with reoccurring stories that align, the degree of exaggeration appears limited. Finally, due to the student researcher's background, with prior knowledge of the organization, there is a chance that some of the interpretations of the data were biased.

Further Research

Based on the present study, further research could focus on the role of the middle-manager in the bottom-up implementation of the performance management (PM). Performance management systems (PMS) are extremely complex and comparable to accounting practices, no *one size fits all* model exists for implementation. Thus, as prior research suggests, (Wouters & Wilderom, 2008), user involvement could be beneficial even at the design phase of the PMS. Taking this a step further, a topic for future research could be how organizations may create favorable conditions for PMS development. Perhaps this could shed light on how the middle-manager could better convey only the relevant information to upper-management, thus addressing the issue of incompleteness for both parties. This, in turn, could assure establishment of the closed-looped process in strategy deployment and feedback retrieval.

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Appendix A

What questions

1. What is the vision and mission of the organization and how is this brought to the attention of managers and employees? What mechanisms, processes, and networks are used to convey the organization's overarching purposes and objectives to its members?

2. What are the key factors that are believed to be central to the organization's overall future success and how are they brought to the attention of managers and employees?

3. What is the organization structure and what impact does it have on the design and use of performance management systems (PMSs)? How does it influence and how is it influenced by the strategic management process?

4. What strategies and plans has the organization adopted and what are the processes and activities that it has decided will be required for it to ensure its success? How are strategies and plans adapted, generated and communicated to managers and employees?

5. What are the organization's key performance measures deriving from its objectives, key success factors, and strategies and plans? How are these specified and communicated and what role do they play in performance evaluation? Are there significant omissions?

6. What level of performance does the organization need to achieve for each of its key performance measures (identified in the above question), how does it go about setting appropriate performance targets for them, and how challenging are those performance targets?

7. What processes, if any, does the organization follow for evaluating individual, group, and organizational performance? Are performance evaluations primarily objective, subjective or mixed and how important are formal and informal information and controls in these processes?

8. What rewards — financial and/or non-financial — will managers and other employees gain by achieving performance targets or other assessed aspects of performance (or, conversely, what penalties will they suffer by failing to achieve them)?

9. What specific information flows — feedback and feedforward —, systems and networks has the organization in place to support the operation of its PMSs?

10. What type of use is made of information and of the various control mechanisms in place? Can these uses be characterised in terms of various typologies in the literature? How do controls and their uses differ at different hierarchical levels?

How questions

11. How have the PMSs altered in the light of the change dynamics of the organization and its environment? Have the changes in PMSs design or use been made in a proactive or reactive manner?

12. How strong and coherent are the links between the components of PMSs and the ways in which they are used (as denoted by the above 11 questions)?

Appendix B

The list of questions that were used as a baseline for the interviews. Not all questions were asked during every interview, and some alterations were made to fit into context.

o *Ice-Breaker Question*
  - What does a regular day of work look like to you?

o *Specific Questions*
  - Who were included in the design of the KPI(s)?
  - Was the shift department involved in the design phase of the KPI(s)?
  - Is there anyone else that you think should have been included in the design process of the KPI(s)?
  - Were you allowed to choose the your KPI(s) freely?
  - When selecting troublesome areas within your department, why did you end up choosing the ones that you did?
  - What was the most challenging part of the design phase of the KPI(s)?
  - What is your role in the PM process?
  - Has the performance management processes influenced the day-to-day operations?
  - Do you enjoy the work related to the PM process?
  - How do you collect the data for the KPIs?
  - Why did you (the department) chose to join the pilot project?
  - What do you think is the reason that organization to now beginning to implement PM?
  - What was the most challenging regarding the implementation phase of the KPI(s)?
  - Are there regular meetings here in the department where the PM process is discussed?
  - Do you believe that the chosen KPI(s) addresses the actual issue(s) in the area that you have chosen?
  - Have you revised the KPI(s) since you began? → If yes, Why?
  - For how long have you collected data for the KPI(s)?
  - Is there scheduled a time/date for revision of the KPI(s)?
  - Is the middle-manager asking about the KPI(s)? / Do you as the middle-manager ask about the KPI(s)?
  - Is upper-management inquiring about the KPI(s)?
  - Has the PM process resulted in more, or less work for you?
  - Is it possible to tell if the operator in the area is doing a good or a bad job, based on the chosen KPI?
  - Can you as an operator influence the outcome of the KPI?

o *Round-up Questions*
  - Is there something that we did not discuss regarding the process that you think we should talk about?
  - Do you have any questions for me?

o Follow-up Questions. Asked to clarify or further explore certain topics.
  - What do you mean by that?
  - Could you please give me an example?