TAMPEREEN TEKNILLINEN YLIOPISTO
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DESIGN AND UTILIZATION OF PERFORMANCE MEASUREMENT SYSTEMS AS A METHOD OF CONTROL IN A MANUFACTURING FIRM

Master's thesis

Examiner: Professor Petri Suomala

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ABSTRACT

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Performance measurement systems are one of the most important tools of management control. Performance measurement provides managers tools for planning, coordinating, focusing, monitoring, and evaluating. Most of all it is a way of deploying higher level strategies into action in the lower levels of the organization. This thesis examines the design and usage of performance measurement systems. The usage aspect will be considered from the perspective of the overall usage process, and also the way the managers use performance measurement as a method of control. The main goal is to clarify the structure and role of performance measurement systems as part of the organization's control systems, and managerial work. The research problem chosen is "what is the role of performance measurement systems as a method of control in managerial work?"

The thesis consists of two parts. First, in the literature review part, the theoretical foundation is built by examining the literature on performance measurement system design and usage. In the design section, the recommendations on measure selection and system structure are discussed, after which the process of using performance measurement systems is introduced and linked to management work. In the second part, based on the literature review, analysis of internal documents, and interviews, a performance measurement system and a usage process for the case organization are developed.

The thesis indicates that the performance measurement system design should encompass the whole organization, being able to integrate the different divisions and functions of the organization, as well as deploy organizational vision from the top level to the shop floor, and contain a balanced view of the different sides of business such as customers, shareholders, operational excellence and future growth. Managers use performance measurement systems as control systems through feedback loops. As performance information is compared to set targets and communicated to the management, the managers will then act depending on the nature of the information. Managers may use diagnostic control, taking corrective actions to variations from target, or in the case of strategic uncertainties, adopt an interactive form of control, where through debate and dialogue the performance measurement information is rigorously used in order to counter the uncertainties.

TIIVISTELMÄ

TAMPEREEN TEKNILLINEN YLIOPISTO
Tuotantotalouden koulutusohjelma
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Suorituskyvynmittausjärjestelmä on yksi tärkeimmistä johdon ohjausjärjestelmistä. Sen avulla johtajat voivat suunnitella, koordinoida, ohjata huomiota, valvoa ja arvioida. Ennen kaikkea se kuitenkin mahdollistaa ylemmän tason strategioiden jalkauttamisen läpi organisaation. Tämä diplomityö tutkii suorituskyvynmittausjärjestelmien suunnittelua ja käyttöä. Käyttöä käsitellään kahdelta kannalta: yleisen käyttöprosessin, sekä sen, miten suorituskyvyn mittausta käytetään johtamistyössä ohjausjärjestelmänä. Tutkimuskysymyksenä on "mikä suorituskyvynmittausjärjestelmien rooli on johdon ohjausjärjestelmänä?"

Diplomityö koostuu kahdesta osasta. Ensin rakennetaan teoreettinen pohja tutkimalla aihetta koskevaa kirjallisuutta suunnittelun ja käytön kannalta. Suunnitteluosassa luodaan suositukset mittareiden valinnalle ja järjestelmän rakenteen suunnittelulle. Tämän jälkeen esitellään järjestelmien käyttöprosessia ja se yhdistetään johtamistyöhön. Toisessa osassa kirjallisuuskatsaukseen, tapausorganisaation sisäisiin dokumentteihin sekä haastatteluihin pohjautuen suunnitellaan organisaatiolle suorituskyvynmittausjärjestelmä ja sen käyttöprosessi.

Tuloksena havaittiin, että suorituskyvynmittausjärjestelmän pitäisi kattaa koko organisaatio, integroiden eri organisation funktiot ja yksiköt, sekä jalkauttaa ylemmän tason strategiat aina organisaatiohierarkian alimmille tasoille asti. Tämän lisäksi sen tulee tarjota tasapainoinen kuva organisaation toimintaympäristöstä ja suorituskyvystä. Johtajat käyttävät suorituskyvynmittausjärjestelmiä niiden palautejärjestelmän kautta. Kun suorituskykyinformaatiota verrataan asetettuihin tavoitteisiin ja kommunikoidaan johtajille, he reagoivat riippuen tiedon luonteesta. He voivat käyttää tietoa diagnostisesti, pyrkien korjaamaan variaatioita tavoitteista rutiininomaisesti, tai strategisten epävarmuustekijöiden ollessa kyseessä siirtyä käyttämään interaktiivista ohjausta, jossa keskusteluiden ja väittelyiden kautta suorituskykytietoa käytetään aktiivisen ja osallistuvan johtamisen välineenä epävarmuuksien poistamiseksi.

PREFACE

First of all, I would like to thank Arto Halonen for giving me a chance to do my master's thesis on such an interesting topic, as well as for directing the work with comments and feedback. Performance measurement has been a point of interest for me throughout my studies, so completing them on a thesis about it is only fitting. My gratitude goes to the examiner of this thesis, Professor Petri Suomala, for his guidance, feedback and help in the process. The interviewees and numerous professionals from the case organization deserve my gratitude for providing me with their time, insightful comments and feedback. Also my father Jari Jokinen deserves acknowledgement for sharing his thoughts on the practical side of the topic.

I would also like to thank all of my friends and family for their help and support. It's been a busy spring, and doing the thesis while working full time has taken up a lot of my free time. Hopefully now some of it will free up for you as well.

Tampere 12.05.2013

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Jammu Jokinen

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1. INTRODUCTION

Performance measurement has been defined as the process of quantifying the efficiency and effectiveness of an actor, or the outcome of action. Efficiency refers to how economically the firm's resources are used to achieve set targets, while effectiveness measures the extent to which the targets are met. A performance measure is defined as a metric used in this process. A set of performance measures form the performance measurement system (PMS). (Neely et al. 1995) The academic literature on performance measurement is broad and the motivation for using performance measurement systems is well established.

Performance measurement originates from quantifying financial measures of performance such as profit, return on investment and productivity. Performance measurement practices are traditionally based on cost accounting, and often focus on controlling and reducing direct labor costs. Due to the changes in the competitive environment with the share of direct labor costs diminishing, customer requirement changing and globalization of competition, the view on performance measurement has evolved to include such activities as planning, coordination, learning and continuous improvement. Performance measurement is cited to provide competitive advantage through improving quality, reducing set-up times, increasing flexibility, improving product, process, customer and market development, reducing randomness, and in many other ways. (Kaplan 1983; Gomes et al. 2011).

An often cited function for performance measurement systems is supporting decision making (Sink and Smith 1999). Indeed, Simons (2000) has argued that one of the primary purposes for performance measurement is to enable fact-based management. This means that decisions made by managers are based on hard, quantified data. To support management by facts, performance measurement system acts as an information system. It collects data, processes it, and delivers information of people, activities, processes, products, business units, etc.

Performance measurement systems not only aid decision making, but also organizational communication. The alignment and communication of objectives is one of the performance measurement system's functions (Simons 2000; Kerssens-van Drongelen and Fisscher 2003; Neely et al. 1994). Forza and Salvador (2000) argue that performance measurement systems do this by structuring communication between different organizational units. Neely et al. (1994) quote Erban (1989) and Flowler (1990) stating that in addition to communicating direction in the long run, a related task

for the PMS is to communicate organizational focus in the short term. This is due to the fact that things that are measured are considered important, while the things not measured are generally considered less important. (Waggoner et al. 1999)

A prerequisite for coordination is the ability to communicate and agree on the objectives within the organization. Ghalayini et al. (1997) argue that one of the ways in which the performance measurement system contributes to achieving competitive advantage is through monitoring the achievement of targets. As objectives are set and coordination is established, the organization must be able to monitor its progress. By supporting the target setting process, performance measurement systems also contribute to the planning processes of the organization. For example, many companies are adopting new manufacturing philosophies such as total quality management (TQM), just-in-time (JIT), or lean production, and to assess their success they need performance measurement systems. A company adopting lean production principles might set a target for takt time, and periodically review how the organization is developing on the achievement of that target.

Due to having a set objective or a standard, a performance measurement system also allows the identification of good performance (Sink and Smith 1999; Neely et al. 1994). Goold and Quinn (1990) add that performance measurement enables management to determine whether a business unit is performing satisfactorily, and thus provides motivation for business unit management to continue to do so. The motivation aspect is echoed by Vorne (2007). According to the literature, managers must be personally motivated to seek the targets that are in line with the organization's objectives. Vehicles for this are often rewards or incentives, and feedback that are based on the measurement system (Kerssens-van Drongelen and Fisscher 2003).

Performance measurement system as a tool for monitoring extends to not only assessing the achievement of targets, but also detecting emerging problems and opportunities on areas that might be measured, but which are not currently in the manager's focus (Simons 2000). As performance is monitored, the system gives important signals that trigger management intervention if needed (Goold and Quinn 1990; Sink and Smith 1999; Kerssens-van Drongelen and Fisscher 2003). An example of this would be a firm that measures inventory levels. Even though inventory level might not be of strategic importance to that firm at a given time, and the organization's focus is directed on for example customer requirements, a performance measurement system would be able to warn the management about rapidly increasing finished goods inventory. At this point, the management would intervene and address the issue.

Gomes et al. (2006) report that managers often expect that a performance measurement system should not only alarm, but also diagnose the reasons for the current situation, and indicate what remedial action should be undertaken to correct it (Bond 1999;

Jablonsky 2009). Continuing the previous example on inventories, the performance measurement system might be able to indicate that delivery times to the customer have been increasing as well, which would indicate a logistics issue.

Maskell (1992) argues that the measures in a performance measurement system should not just monitor, but stimulate continuous improvement. Performance measurement systems contribute to organizational learning and continuous improvement as they signal deviations from set targets and provide feedback on actions taken (Kerssens-van Drongelen and Fisscher 2003). As Bond (1999) states, comparison forms the basis for learning. Learning takes place when an organization achieves what is intended, or when there is a mismatch between intentions and outcomes.

Vorne (2007) has argued for performance measurement systems' ability to increase operational performance not only in managerial work, but also on the shop floor. He states that performance measurement is an effective way to expose, quantify and visualize waste, such as overproduction, idle time, unnecessary transport, over-processing, inventory, unnecessary motion and defects. A performance measurement system might measure the amount of defects a process produces. By making corrective adjustments to the process, measuring the results, and then adjusting again, the process is continuously improving.

Academic debate on performance measurement systems has been active since 1980's, and new publications on it are constantly made. These recent research directions have also opened new perspectives in performance measurement system design and usage processes. Even though the different benefits of performance measurement systems are well documented in the literature, the realization of them seems not to be. The actual implementation and usage of performance measurement systems has gained relatively little attention (Gomes et al. 2004), even though they are considered to be even more important than the design of the system (Gomes et al. 2006). The most recent and important new perspectives on the topic for this thesis are the concepts of enabling control and performance measurement systems as a part of management control systems. This thesis attempts to take a step towards moving from purely discussing performance measurement system design to the ways in which performance measurement systems are implemented and used as part of the control systems managers have available for them.

1.1. Research methodology, problem and objectives

The research problem that is focused on is "What is the role of performance measurement systems as a method of control in managerial work?" The problem sets out to define the ways in which performance measurement systems are recommended to

be designed and used, and how managers use performance measurement systems as a method of control among the other management control systems.

The objective of the empirical part of this thesis is to design a performance measurement system and the process for utilizing it for the case organization. Objectives for these are that the system and the process:

- Follow the guidelines given in the academic literature
- Enable visibility across the organization
- Focus attention to the organization's financial results
- Enable performance-centered culture in the organization

As an outcome of this thesis, therefore, a performance measurement system and usage process will be constructed. Since the literature on performance measurement system design in extensive, it should be utilized in the process of designing the system. For this, the literature on performance measurement systems will be reviewed, and the principles found used in the design process. Three latter objectives above describe the requirements set by the case organization. One of the most important motivations for the case organization is to get better information of the processes and performance of the organization. For example, it should be possible to evaluate the performance of plants. The system should also be able to move the organizational discussion more towards the financial impacts of decisions, and make clear links from actions to financial results. Overall, this aims for driving the organizational culture towards performance-orientation.

The research methodology chosen for this study is constructive research. In constructive research, an understanding of the topic is built by studying the prior academic literature, and collecting information in various ways in order to build a "construction" – in this case a performance measurement system framework and usage process. In addition to academic journals and books, information will be gathered through internal documents and interviews of case organization personnel. Constructive research is normative, meaning it attempts to define how something should be done.

1.2. Structure of the thesis

The structure of this thesis is summarized into figure 1.1. To answer the problem first the theoretical foundation is built. The design of performance measurement systems will be discussed in chapter two. Here, the academic literature on performance measures and performance measurement systems is explored. After this, the implementation of performance measurement systems will be discussed in chapter three, after which the thesis will move on to the process of using performance measurement systems. Chapter

four focuses into the usage of performance measurement systems as a tool of managerial-managerial work.

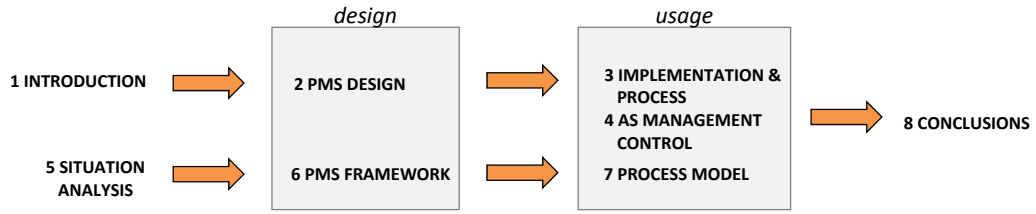


Figure 1.1. Structure of the thesis.

The empirical part of the thesis starts in chapter five by introducing the case organization, its starting points, and analyzing the current performance measurement systems in place. In chapter six the new performance measurement system will be designed, and in chapter seven the usage process is developed. Chapter eight concludes the thesis by summarizing the theoretical findings and empirical results.

2. PERFORMANCE MEASUREMENT SYSTEM DESIGN

This chapter sets out to define the principles offered in the literature on performance measurement system design. Models used by Bititci (1995) and Neely et al. (1995) divide design to individual measures and performance measurement system structure. Using this division, this chapter consists of two parts: the first one analyzes the attributes and selection of the individual performance measures, and the second part discusses performance measurement system structure design.

2.1. Performance measures

A performance measure is defined as a metric used to quantify the efficiency and/or effectiveness of an action that has been specified a title, calculation formula, a person who carries out the calculation, and the data source (Neely et al. 1995). Another term used on the subject is key performance indicator (KPI), which has been defined as the number or value which can be compared against an internal target, or an external target, benchmark, to give an indication of performance (Ahmad and Dhafr 2002). In this thesis performance measure and key performance indicator are interpreted to be the same.

Kaplan and Norton (1993) have stated that the critical test of any performance measurement system is its set of measures, since through them one should be able to see the company's competitive strategy. This view has considerable support in the literature (Maskell 1992; Cross and Lynch 1988; Schiemann and Lingle 1997; Grady 1991). This section concentrates on discussing the selection principles for performance measures.

2.1.1. The attributes of a performance measure

Laitinen (1992) has presented a list of criteria any metric should fulfill. These criteria are divided into three categories: factual, philosophical, and functional (table 2.1). Philosophical criteria are related to the target of measurement, factual criteria to the attributes of the measurement system, and functional to the usefulness of the measurement outcomes. Factual and philosophical criteria attempt to ensure that the results of measurement represent reality, while functional criteria aim to make the results useful to the user.

Table 2.1 Criteria for performance measures. (Laitinen 1992)

Category	Factual criteria	Philosophical criteria	Functional criteria
Focus	Criteria for the measurement system	Criteria for target of measurement	Usefulness of the outcomes
Criteria	Representativeness	Existence	Relevancy
	Validity	Identifying	Reliability
	Uniqueness		
	Meaningfulness		

Factual criteria consist of four requirements: representativeness, validity, uniqueness and meaningfulness. Representativeness refers to how well the target of measurement can be described with quantified metrics. For this requirement to be filled there has to be a correlation between the results of measurement and the attributes of the phenomenon. For example, a measure of customer satisfaction may be difficult to quantify. Validity criterion ensures the effectiveness of the measure: that the measure actually describes the attributes of what is wanted to be measured. Validity tells how well the potential representativeness has been utilized. (Laitinen 1992)

The third factual criterion, uniqueness, refers to how changing the measurement scale affects the results. This could be argued whether it is a criterion to fulfill at all, but more of an attribute. For example, in an interval scale all results of measurement may be added a number without changing the relative positions of the results, meaning that the results are not unique. This would be the case in a list of preferred suppliers, but not with the measures of available capacity in the organization's plants. In that case, the performance measures are absolute and significant as numbers. Final requirement set by the factual criteria is meaningfulness. Meaningfulness refers to how empirically meaningful a result of measurement is. This means that for every result of a measurement, there is a corresponding empirical phenomenon. (Laitinen 1992)

Philosophical criteria consist of existence and identifying criteria. Existence criterion states that the target of measurement should exist, meaning that there is some real world phenomenon that is being measured. In other words, the existence criterion would not be filled in the case of measuring something non-existent, such as the amount of luck the organization has. Identifying criterion refers to the requirement that there must be some kind of understanding about the target before it can be measured. (Laitinen 1992)

For example, a firm must have an idea of what constitutes customer satisfaction if it is to measure it, unless asked straight from the customer.

The final set of criteria, functional criteria, relate to the usage of the measurement. There are two functional criteria: relevancy and reliability. The relevancy criterion states that only those measures that relate to the manager's decision making model are relevant. For example for a plant manager only those measures relating to decisions made in the managing of the plant would be relevant. The last criterion, reliability, is filled if the measure can be trusted to deliver consistent results under the same conditions and level of performance. A measure should give the same results every time the measurement is performed. (Laitinen 1992)

The most important of these criteria according to Laitinen (1992) are validity, reliability and relevancy. The effects of validity and reliability have been illustrated in figure 2.1, where the target boards represent the target of measurement, and the dots are results of measurements.

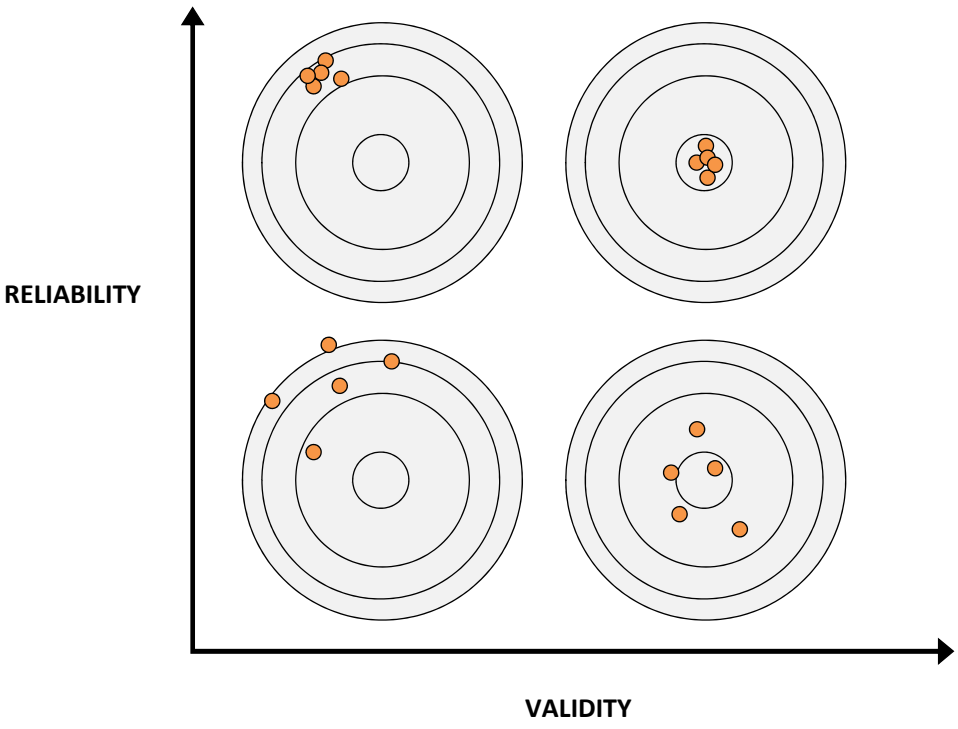


Figure 2.1 Measure reliability and validity.

A performance measure with low validity and reliability would be giving wrong results (invalid) that are scattered widely (unreliable), meaning there is no consistency or bias in the results: they seem to be random. A measure with high reliability but low validity would be consistently giving wrong results, but their bias would be consistent. A measure with high validity but with low reliability would be giving on average good results, but the variation would be high. A good measure should be able to deliver results with high validity and reliability, meaning that the results are consistent and

correct. If one would incorporate relevancy into the illustration, it could be presented in a way that a measure with low relevancy has the wrong target board that is aimed at in the first place.

2.1.2. Input, process, and output measures

Given that a measure fills the requirements set in the academic literature, a manager still faces the question of what to measure. There have been numerous different classifications given for performance measures, and in this chapter the most common and relevant to the measures' usefulness will be reviewed. Performance measures can be classified by the target of measuring: inputs, processes or outputs (figure 2.2). This choice has implications on the effects performance measurement produces.

Figure 2.2 Process model.

Simon (2000) argues that there are four factors that have to be taken into account when selecting which one to measure. These are technical feasibility of monitoring and measurement, understanding of cause and effect, cost and desired level of innovation. Simons has only discussed measuring process or outcomes, since he argues that only in the case of measuring processes or outcomes being unfeasible, measuring inputs as a primary means of control is recommended. Cardinal (2001), however, states that for radical innovation measuring inputs may be suitable, since it does not limit the scope or action or the outputs.

The first factor, technical feasibility, refers representativeness defined in previous section, or to the extent to which the process or its outcomes can be measured. In principle, the process can only be measured directly if it is possible to observe it in action. This may not always be the case, as the processes involved in creating the outcome may be too complex. As an example of this case, Simons uses the income statement: the outcome to which too many processes contribute to observe directly. Therefore, the outcome must be measured instead. Ouchi (1979) states that measuring outcomes should be evaluated for feasibility as well. Not all outcomes can be measured accurately. For example, the outcomes of a research team's work may be difficult to define in advance.

The second factor, cause and effect relationship should be understood in order to gain control through measuring (Ouchi 1979). The relationship between the transformational process and the outcome is often unclear, as it is in the case of the research team. In

other cases, such as manufacturing processes, the relationship might be easily proven. In summary, the process should only be measured if its relationship with the outcome can be defined. (Simons 2000)

In the case that both processes and outputs can be measured feasibly and the cause and effect relationship between them is well understood, the next factor to consider is cost. Simons (2000) presents two components of the cost factors: the cost of measuring, and the cost of not measuring. Usually the case is that measuring outputs is less costly and time consuming. However, processes relating to safety or quality may be so critical, that not measuring them is more expensive in the case that something goes wrong.

The fourth factor, desired level of innovation, relates to how measurement affects action. Measuring a process with a given set of measurable guides the way the process is ran. Measuring outputs, however, does not define the process they are the results of. Thus, choosing to measure processes stifles innovation and encourages doing things in a standardized way (Cardinal 2001). Measuring outputs may lead to innovation in the processes producing them. (Simons 2000) Cardinal (2001) echoes this by saying that measuring outputs may indeed lead to incremental and process innovations, but for radical innovations controlling outputs is too restrictive, and recommends measuring inputs instead.

In summary, it would seem that in choosing the target of measurement it is important that it is understood and possible to measure, but also that it is understood that measuring different targets will produce different effects. Measuring inputs may lead to radical innovations, measuring process encourages process standardization, and measuring outputs may lead to innovations in processes producing them.

2.1.3. Financial and non-financial measures

A widely discussed topic in the performance measurement literature is the classification of measures into financial and non-financial measures. Traditionally, financial measures such as profit and return on investment were used to measure the performance of a firm. Since the 1980s, however, this approach has taken considerable criticism in the academic literature. (Gomes et al. 2004) There are different schools of thought regarding financial and non-financial performance measures. Some authors have tried to respond to the criticism and improve financial measures; others have argued that financial measures should be forgotten, and that financial results would follow from focusing on the operative functions in measurement. (Kaplan and Norton 2005)

Most of the criticism on financial measures falls into four categories: incompatibility with modern environment, internal focus, history-orientation, and short term orientation. Lemak et al. (1996) have argued that the traditional cost accounting methods were adequate as performance measurement for a single-product, high-fixed cost firm, but

now the environment has changed significantly. In a modern manufacturing setting fixed costs make up a significantly higher portion of total costs, making traditional measures, such as direct-labor hours or total machine hours problematic to use as an allocation basis for costs, since there may be no relationship between them. Thus, traditional cost accounting systems may cause action on false basis. The response from the academic world to this criticism has been activity-based costing (ABC), which attempts to describe the cost structure of a firm more accurately. Lemak et al. (1996), however, dismiss this as enough to correct the excessive reliance on financial indicators, since they have other problems.

The internal focus of financial measures is evident: they are normally measuring how the organization performs from an internal perspective. Measures such as total costs or return on capital employed do not take into account the company's stakeholders. Internal view also encourages local optimization and may cause internal disputes on cost allocations across business units. (Fry and Cox 1989) Lemak et al. (1996) argue that it is vital for companies to become customer-oriented in their measures. This external focus promotes such areas of organizational performance as product quality, dependability, waste reduction, timeliness, flexibility and innovation, thus making the organization more efficient in these areas.

History-orientation or the term lagging indicator has often been related to financial measures (Clinton and Ko-Cheng 1997; Eccles and Pyburn 1992). They are backwards looking, often reporting facts that have already occurred, and these facts are the results of actions made perhaps several months earlier. Ghalayini et al. (1997) even argue that financial reports are usually too old to be useful.

Financial measures encouraging short term thinking is widely agreed in the literature (Kaplan 1994). Kaplan (1994) argues that a manager measured only by financial indicators would be tempted to decline from spending on research and development, employee training and skill development, enhancing brands or opening new distribution channels, which could expand shareholder value and create long-term value. This is because these kinds of investments will reflect in the profit and loss statement as flat or declining performance, since the financial system only captures the expenses, not the potential value created. Moreover, focus on only financial measures may actually hurt future value, as in the example. It might lead the manager to act in ways that makes customers dissatisfied, depletes the stock of good products and processes coming out of R&D labs and diminishes the morale of employees.

Despite the considerable amount of criticism presented on financial measures, Kaplan and Norton (2005) argue that both kinds, financial and non-financial of measures are needed and useful. The problem with non-financial measures according to them is that the alleged linkage between improved operative performance and financial results is

uncertain. One reason for this might be that the operative measures used were simply incorrect, and tells of a failure in strategy setting. Thus, it is necessary to have financial measures as well as operative measures. This view seems to be currently widely accepted in the literature. (Maskell 1992; Kaplan 1994; Kaplan and Norton 2005)

2.1.4. Other selection principles

Kaplan (1994) argues strongly that performance measurement system development should be led by the president of the business unit that the measurement system is being developed for. This is to ensure that the measures are related to the company strategy. He states that "…if the president does not think he or she needs a new set of measures, then assigning a task force won't get the job done." Indeed, it seems that PMS need the support of upper management. As Zammuto (1982) found out, the measures selected for a performance measurement system typically reflect the interest of those who comprise the dominant coalition of the firm. The measures should not, however, be selected solely by the top manager alone. Crawford and Cox (1990) have suggested that the measures for a particular unit should be selected with the people involved. This means involving such stakeholders as customers, employees and managers into the selection process.

It is often argued in the literature that the right set of KPIs is unique for every firm, depending on industry and strategy (Ahmad and Dhafr 2002). Kaplan (1994) states that performance measures are not generic, but instead should relate to company strategy or business unit strategy. He adds that measurements will only make sense when observed in terms of the firm's strategy. The usually suggested way of devising performance measures is indeed to define the strategic objectives of the firm, and then ensure the measures monitor how they are achieved. (Kaplan 1994) Cross and Lynch (1988) warn that unless measures are chosen according to the firm's strategy, the system would yield either irrelevant or misleading information, and could even undermine the achievement of strategic objectives. They add that measures in isolation from the strategy would distort the management's understanding of how the organization as a whole is proceeding with strategy implementation.

There is also an interesting problem with common and unique measures. Common measures refer to measures common to a group of people, plants or other units, whereas unique refers to measures in use only for a certain unit. Lipe and Salterio's (2000) research has shown that when managers are faced with comparing the performance of multiple evaluatees that share a set of common measures as well as some unique, the common measures get weighed more. This means that unique measures may not be as effective if there is a chance person, plant or other unit will be compared to others on some common measures at the same time. This might partly explain the popularity of financial measures.

Balancing the metrics is another key issue. Balance here refers to the performance measurement system including metrics from different areas of business so as to form a comprehensive representation of performance. Unbalanced metrics may lead to adverse effects of measurement. For example if a firm measures on-time delivery, hoping for improvements in process reliability, cycle times and waste, the employees may be tempted to protect themselves by quoting long lead times to customers or growing significant inventories. The firm may achieve reliable deliveries, but will do that on the expense of customer satisfaction or poor return on capital employed. The processes would have stayed just as poor as earlier. (Kaplan 1994)

2.1.5. Analyzing performance measure validity

Boyd and Cox (1997) have pointed out that to make sure the validity of measures, and that they deliver the expected results, the measures should be analyzed. The way proposed by them is called the negative branch technique. Negative branch is a four-step process:

1. Write down the positive effects that are expected to result from using the measure.
2. Write down a list of negative effects that might result from using the measure.
3. Connect the proposed solution with your suspected positive and negative effects by cause-and-effect relationships.
4. Read the negative branches from bottom up using if-then logic, scrutinizing every statement and logical connection along the way, and make necessary corrections.

By using negative branch, managers are thus forced to make explicit the logic of measuring one thing to get results in another. An example Boyd and Cox (1997) present is measuring efficiency. Measuring efficiency is often done in order to gain increased profits (figure 2.3).

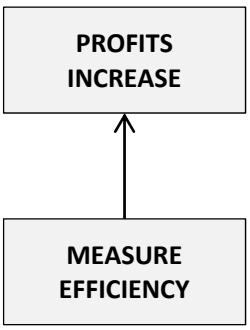


Figure 2.3. First step of negative branch (Boyd&Cox 1997).

Using the negative branch technique, the first two steps would be to list the expected positive and negative effects of measuring efficiency. These would be increased profits through lower unit cost, and on the other hand, the possibility of overproduction. Next, these should be connected via cause-and-effect relationships (figure 2.4).

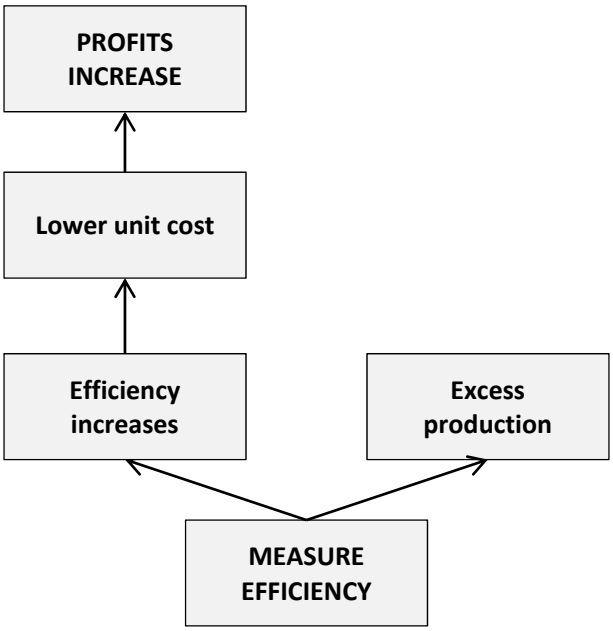


Figure 2.4. Second step of negative branch (Boyd&Cox 1997).

As the fourth step, the branches should next be read from bottom up using "if … then …"-statements and each connection analyzed. If the logic of the statement is not clear, it is called a "long arrow", and should be further defined. A finished negative branch might look like the one in figure 2.5.

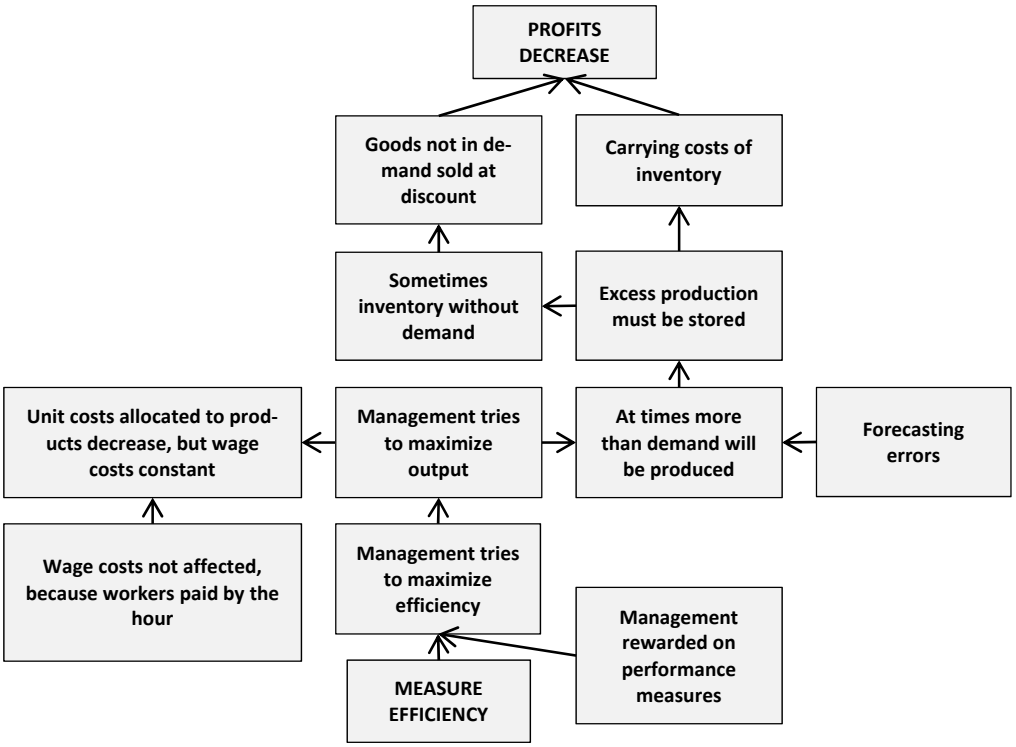


Figure 2.5. Finished negative branch analysis. (Boyd&Cox 1997).

As the process develops, more connections appear and a more comprehensive picture of the effects of a measure is gained. The above example shows that through negative branch analysis the potential negative effects of measuring efficiency are revealed. These factors should be taken into account in the design process in order to ensure validity of the measures.

2.2. Performance measurement system structure

Structuring of performance measures here refers to the way performance measures are organized. To help organizing the measurement system, there are numerous frameworks proposed in the literature. In this chapter some of the frameworks will be presented and discussed, and used as examples of what are the things to consider when organizing a performance measurement system structure.

The framework most widely cited in the literature, and perhaps also used in practice is the balanced scorecard. The balanced scorecard is a performance measurement system that divides measures into four categories: financial, customer, internal business and innovation and learning (figure 2.6). With these four categories, companies are supposed to define their strategic objectives in each one, and then derive measures from them.

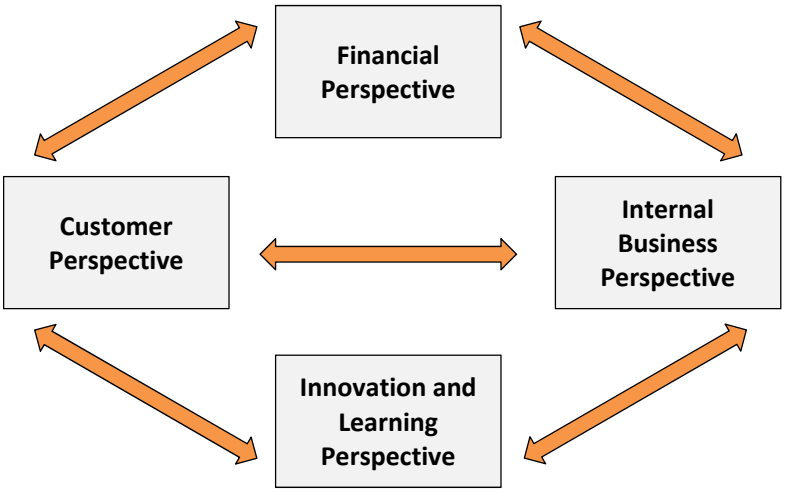


Figure 2.6. The Balanced Scorecard. (Kaplan&Norton 2005)

The financial perspective asks the question "How do we look to our shareholders?" By answering this question, managers must consider whether their strategy, implementation and execution contribute to the bottom line. (Kaplan and Norton 2005) Many authors have criticized financial measures, but they are still widely used among the practitioners. This, according to Kaplan and Norton (2005) is due to the fact that there has been no certain linkage between operative performance measures and financial results. The debate about financial and non-financial measures is discussed in length in chapter 2.1.3. Typical financial measures include cash flow, growth and profitability.

By including customer perspective as a category into the performance measurement system, the balanced scorecard demands managers to translate their general mission statements on customer orientation into specific measures (Kaplan and Norton 2005). Kaplan and Norton (2005) state that the customers' concerns typically can be divided into four categories: time, quality, performance and service, and cost. For each of these categories, according to the balanced scorecard, strategic objectives should be articulated, and these objectives translated into measures. Examples would be lead time for time, defect level of incoming products as measured by the customer for quality, and value created for the customer for performance and service. (Kaplan and Norton 2005)

The internal business perspective measures can be derived from the customer perspective. The company must consider what it must do internally to fulfill customer expectations. The processes and competencies the firm must excel at is specified, and then translated into specific measures. The processes which are critical to ensure customer satisfaction may for example be cycle time, employee skills and productivity. (Kaplan and Norton 2005)

The final perspective of innovation and learning is critical for firms to stay competitive. The other categories of measures might not capture that as the market and customer requirements change, firms must be able to keep improving. (Kaplan and Norton 2005) Measures for this perspective would include such as new products launched and employee training.

Kaplan & Norton (2005) consider the balanced scorecard's strength to be that it makes companies look and move forward, instead of the traditional, backwards looking performance measurement systems. They state that the balanced scorecard puts strategy and vision instead of control to the center. Kaplan (1994) has argued that by including other than financial indicators it can also be used to support long-term value creation.

The balanced scorecard has, however, taken some criticism as well. Neely et al. (1995) argue that it is a relatively complex and costly system. Later Neely et al. (2001) criticize it for not explicitly involving stakeholders such as employees, suppliers, alliance partners, intermediaries, regulators, local community or pressure groups. Furthermore, the literature of balanced scorecard offers little guidance on how to roll the balanced scorecard to the lower levels of the organization.

Design of performance measurement systems is often considered in the literature on only the company level, and typically balanced scorecard literature leaves it at that. A firm is suggested to have three to eight company level objectives that relate to its competitive strategy, and performance measures are then formed to compare how well these objectives are met. However, this kind of approach might be hard to utilize on the lower levels of the organization. As only the company level objectives are being measured, the measures are only useful for the top management.

Bititci et al. (1997) argues that there are two critical considerations for structuring the performance measurement system: deployment and integrity. Deployment's purpose is to ensure that the measures are linked between the different organizational levels. Beischel and Smith (1991) state that a measure that cannot be linked to high-level strategic objective is not relevant, and should therefore be discarded. Integrity is the ability of the performance measurement system to link and integrate the various functions and organizational units to each other. A conceptual illustration of the organizational environment for performance measurement by Bititci et al. (1997) is presented in figure 2.7. It illustrates the way the business includes several business units, which include several processes or functions, which include several activities. In summary, the measurement system should be able to integrate the various business units, functional processes, and be deployed through organizational levels.

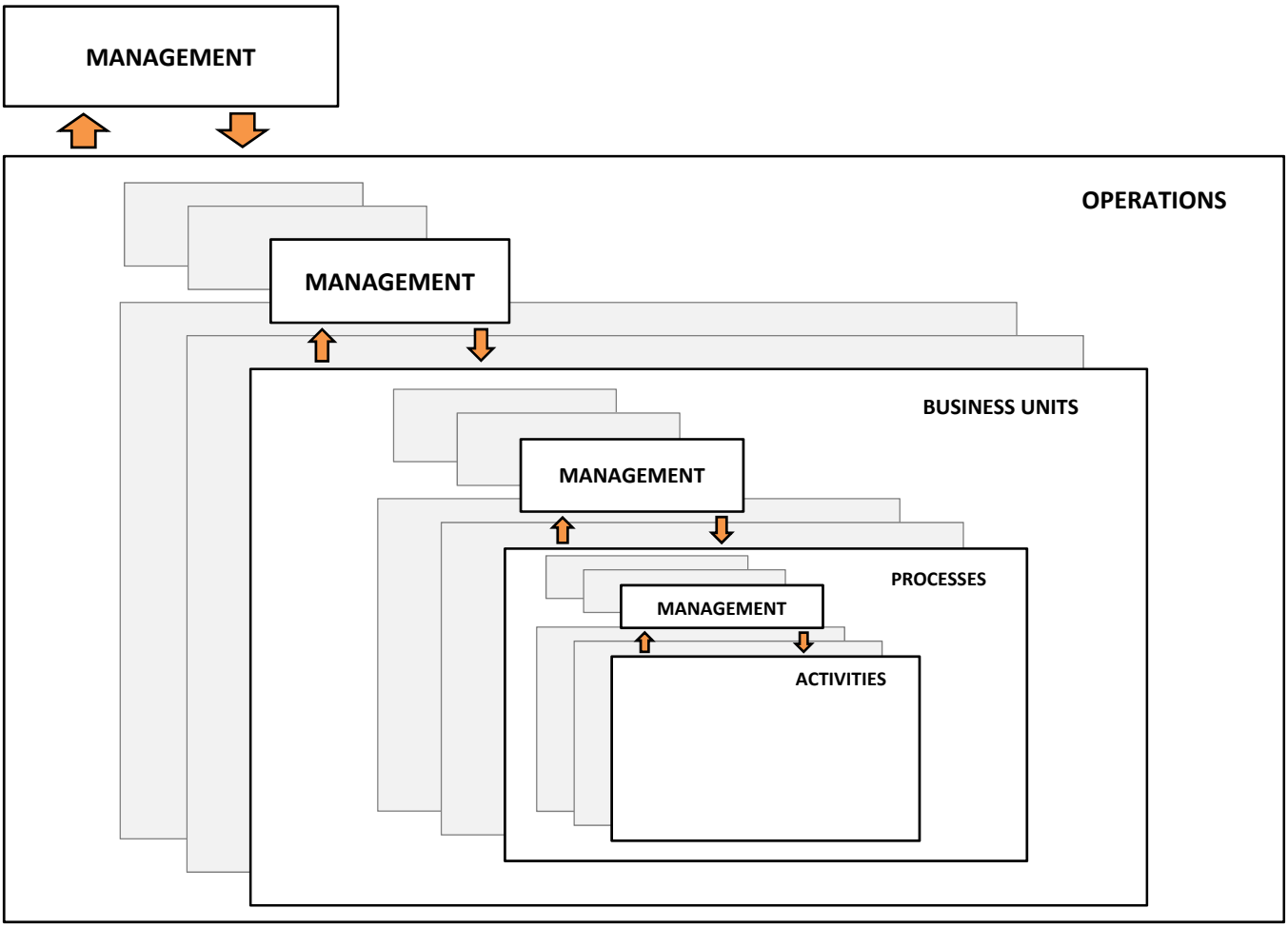


Figure 2.7. Organization levels, business units, and business processes. (Bititci et al. 1997)

Salloum et al. (Salloum et al. 2010) argue that the primary method of ensuring deployment in a performance measurement system is the cascading of all performance measures from strategic objectives throughout the organization. Some authors have attempted to build frameworks for deployment, aligning the higher and lower levels of the organization in the performance measurement system. Cross and Lynch (1988) have presented a framework called performance pyramid. The performance pyramid sets management vision to the top, and then splits it up into market measures and financial measures. These are in turn split up further, until the base, operations, is reached (figure 2.8).

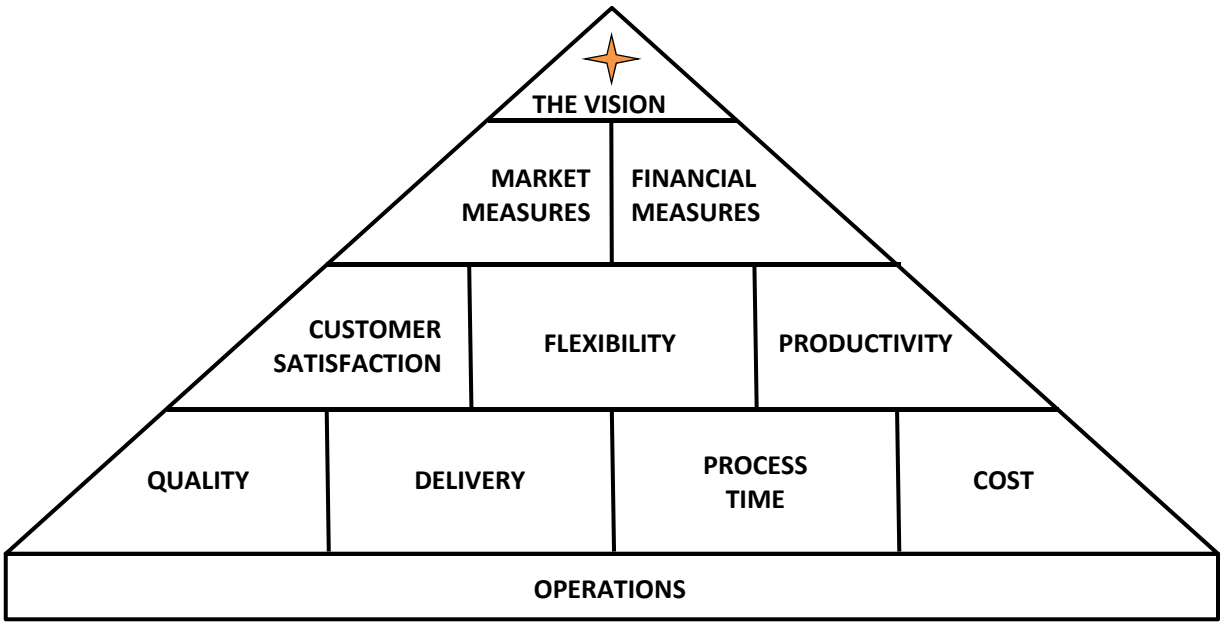


Figure 2.8. The Performance Pyramid (Cross and Lynch 1988).

With this kind of approach Cross and Lynch (1988) aim to get the strategic objectives to flow all the way to the operative level. It gives a more concrete concept of a way to deploy top level visions to the lower levels of the organization through categorizing the parts that make up the vision. The performance pyramid, however, does not go into detail in how to derive the measures, and it does not promote integrity across the whole organization.

Beischel and Smith (1991) have discussed the process of deploying measures in more detail. As measures move higher (lower) in the organization they become more (less) aggregate and broad (narrow) in definition. The way to link these, according to them, is to take a corporate measure, such as return on assets, and then define its determinants that a certain level of manager can affect.

Beischel and Smith (1991) also take into account integrity by separating the different functions and roles that exist within an organization. An example for a manufacturing vice president would therefore be that to ensure return on assets on a higher level, the vice president should minimize inventory days, maximize output on equipment and maximize output on square meters occupied. These would then be further split into lower level targets for the plant managers, and so on (figure 2.9). Finally, these measures would be collected as scorecards for each person to be responsible for.

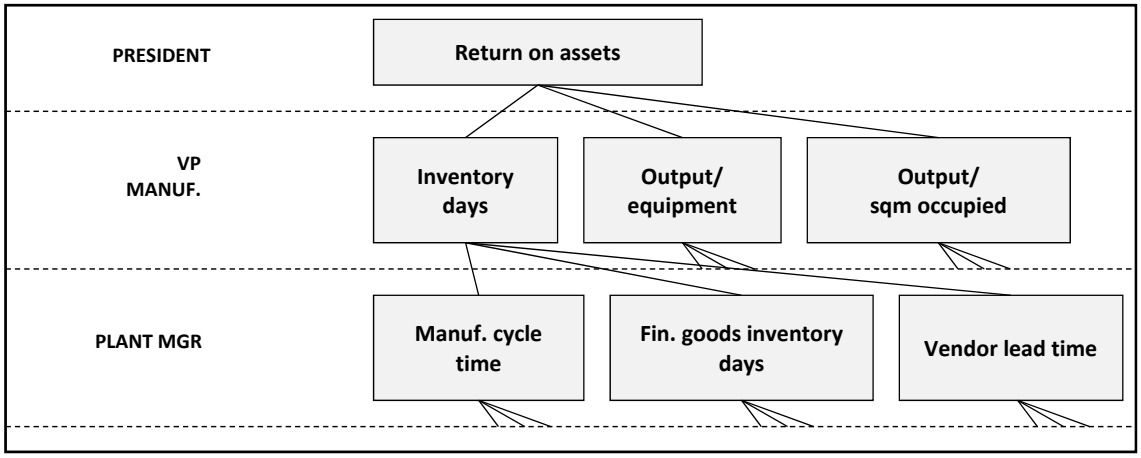


Figure 2.9. Deriving performance measures (Beischel and Smith 1991).

Bititci (1995) goes into detail on deployment in studying how to create the structure for measures in a formalized manner, and identify the linkage between higher and lower-level measures. He proposes a cause-and-effect diagram analysis, where the top level measure is set at the top, and then the causes for that are determined. The process is continued by determining the reasons for these causes, and so on until the operative level is reached. Figure 2.10 illustrates a cause-and-effect diagram for % orders shipped on time.

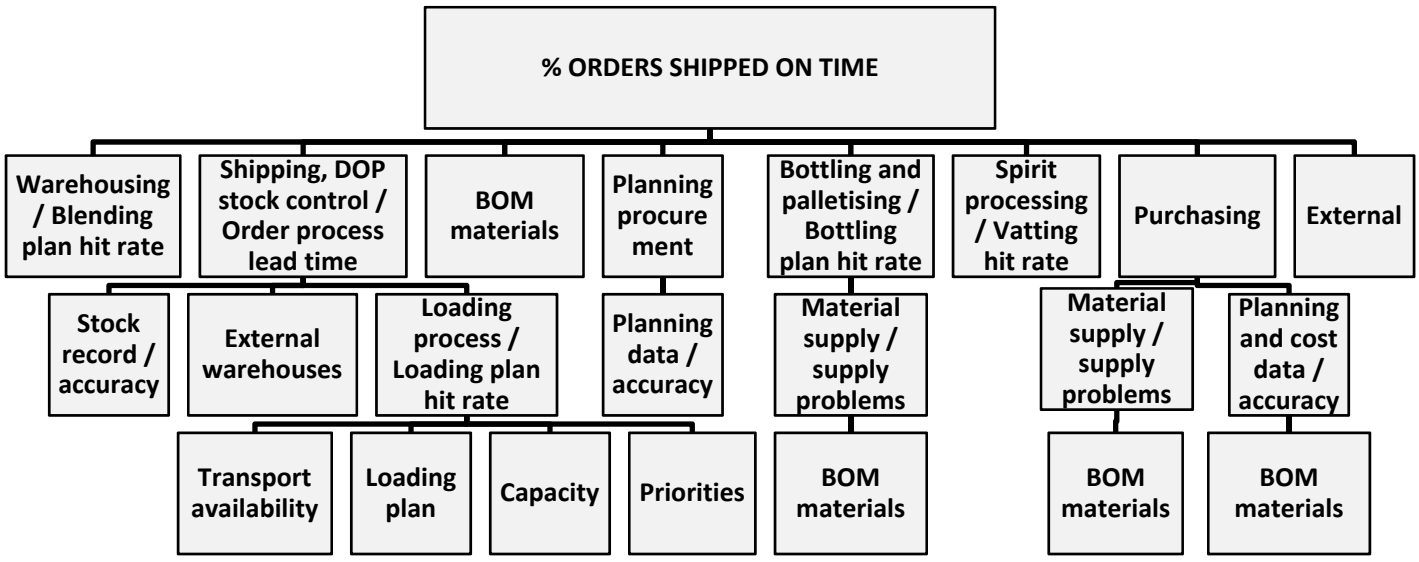


Figure 2.10. Deriving performance measures further (Bititci 1995).

In summary, most important for a performance measurement system structure is that it is balanced, and is able to integrate the organization horizontally, and deploy strategies from the top level to lower organizational levels vertically. Thus, it would seem that the academic literature recommends that the performance measurement system should encompass the whole organization in a balanced way.

3. IMPLEMENTATION AND USAGE

The literature on performance measurement seems to be more focused on designing an effective and efficient performance measurement system, than the actual process of using the performance measurement system as a part of the management work (Goold and Quinn 1990). Gomes et al. (2006) have argued that "…more important than the performance system design or measures design process, must be the implementation and daily measurement process". Bititci et al. (1997) echo this by stating that the effectiveness of the performance management process depends on how the information produced by the performance measurement system is used to manage the performance of the business. This practice is called performance management.

The aim for this chapter is to explore the ways in which performance measurement systems are implemented and used as part of the organization's performance management. First, a way of utilizing performance measurement systems that has gained ground in the recent literature, enabling control, will be presented with principles on implementation and maintenance of performance measurement systems. After this, the usage process will be discussed in more detail with presenting a typical model of illustrating the process of performance measurement.

3.1. Implementation and enabling control

Enabling formalization, a concept by Adler and Borys (1996) has recently gained attention in the performance measurement literature. They have distinguished between enabling and coercive practices of using formalization. The terms enabling and coercive describe the way a manager or an employee experiences the formalization in the organization. Coercive formalization refers to the manager feeling that he is being controlled by the senior management through the system, whereas enabling makes the manager feel like it enables the manager to do his work better. Jordan and Messner (2012) summarize the difference in the context of performance measurement systems by indicating that enabling use of performance measurement systems makes managers treat them as means rather than ends when carrying out their work. This section first discusses the gap between performance measurement system design and utilization: implementation. After this, the concept of enabling control will be discussed from the perspective of general utilization and maintenance of the performance measurement system.

3.1.1. Implementation

Gomes et al. (2004) found out in their review of 388 academic articles related to performance measurement that even though the literature on performance measurement systems is extensive, there has been little discussion about successful implementations. Wouters and Sportel (2005) echo this finding. Implementation, however, is an important part of performance measurement systems usage. In the section the relevant existing literature on performance measurement system implementation is reviewed.

Sink and Smith (1999) propose that as a first step for implementing the performance measurement system, an understanding of the current information system needs to be built. This can be done by collecting the reports received by the top management, and scanning their contents, finding out the distribution lists and methods of usage, along with interviewing the users about the reports. According to Wouters and Sportel (2005) who studied the effects of existing measures to the performance measurement system design process, the existing measures are of much greater importance than traditionally discussed in the literature. The existing measures should be mapped and understood, and utilized in the new system as significant amount of work has already gone into them, and developing new measures is a slow process.

Wouters and Wilderom (2008) studied the characteristics of the performance measurement system development and implementation process that could result in the PMS being perceived by the employees as enabling of their work. Design and implementation of performance measurement systems should be interrelated in order to achieve enabling control. This will result in a more valid, reliable, and understandable PMS for the users. They found four attributes the process should have to contribute to such aim: the process should be experience-based, there should be experimentation, professionalism and the system should be transparent. Next, each of the attributes will be explored in more detail.

The development process being experience-based refers to the identification and utilization of the local experience and knowledge in the process of refining the performance measurement system. Wouters and Wilderom (2008) suggest that an iterative process, where measures are added and removed constantly in the design phase according to the experience of the users is beneficial for enabling use of the performance measurement system. This is because the process of experimenting and adjusting the system will make the employees feel like they own the system.

Jablonsky (2009) has proposed that the measures should be introduced few at a time. Implemented in small batches, they can be evaluated and the measures may demonstrate that they work. He states that measures should then be modified as seen necessary, and the ones doing the modification should be the best operators of the related activity. This

is in line with Wouters' and Wilderom's (2008) experimentation process. In this process single measures are defined, refined and tested by the employees responsible for the measures. Often they are the only ones holding the tacit key knowledge to define the detailed measures. (Wouters and Wilderom 2008)

According to Sink & Smith (1999), however, during the initial months of using the new performance measurement system it should not be changed even if the users requested it. This is to make the users adjust better to a more consistent system in the beginning. After this, however, the measures and the measurement system may benefit from being flexible to changes. This apparent conflict of approaches may mean that in the implementation and development phase, the measures should be modified and adjusted freely, but once the system goes live, it should keep the measurements constant for a while. After that, the modification process may continue.

By making the managers involved feel more like owners of the system, Wouters and Wilderom (2008) argue that the process of implementation and development at the same time counters the problem of incomplete measures. Some authors have questioned the usefulness of performance measurement overall, since capturing the complex business environment in one system of measures would be impossible. A senior manager may consider a performance measurement system too simplistic or formalistic to comprehensively capture the complex nature of business. The senior manager would rather prefer informal control systems based on judgment and general knowledge of the business. (Ansari 1977)

Simon et al. (1987) echo the views of Ansari (1977) arguing that a too formal measurement system plays down the importance of intuition and judgment brought up by experience. A few key strategic control variables, or key performance indicators, would inevitably screen out much information of relevance to a skillful manager. The main argument here for not using formal performance measurement systems would thus be that it tries to make something complex simple, and this is why it receives resistance from managers.

Wouters and Wilderom (2008) however propose that the problem of incomplete measures is partly compensated by a developmental approach to performance measurement system implementation. It engages all personnel whose performance is being measured, and draws on the experience and knowledge of that group to determine the most relevant facets of business. Jordan and Messner (2012) support this by concluding that enabling forms of control might make the incompleteness of measures less of a problem.

Top management support is critical for performance measurement system development to succeed. Wouters and Wilderom (2008) emphasize the importance of management

support, because the development process requires significant investments of time from employees at various levels. (Goold and Quinn 1990) Not only is it enough that the actual information systems are in place, but there has to be a lot of effort put into formulating the key assumptions behind a strategy, monitoring changes in them, and updating the strategy accordingly. This requires investment in analysis, planning, and bureaucracy. Waggoner et al. (1999) cite Gabris (1986) stating that related to this, one of the impediments for performance measurement system usage is the process burden it involves: implementing and maintaining a performance measurement system requires resources, and managers and employees may feel they are taken away from their actual responsibilities.

Wouters and Wilderom (2008) also found that the level of professionalism in a group of people affects the way in which they perceive performance measurement systems. A high performing division with high ambitions is more likely to have a positive attitude towards performance measurement system development, and enables the employees to better participate in the experimentation activity described above.

Finally, transparency was noticed to be a key aspect of enabling performance measurement systems. Here transparency refers to the performance measures are understandable to the employees and that they have firsthand experience with them. The performance measures were not solely designed by the system designer or the accounting personnel, but partly by the actual owners of measures. (Wouters and Wilderom 2008)

For performance measurement systems linked to incentives, McKenzie and Shilling (1998) emphasize the importance of communication of incentive programs. The communication should start as simple, straightforward and participative in the sense that the program's participants should have time to ask questions. Also a member of senior management should be present in communicating the program. After the initial communication round, the program should have some sort of periodic reviews or updates to keep morale up and focus on the program. An illustration of the implementation process is presented in figure 3.1.

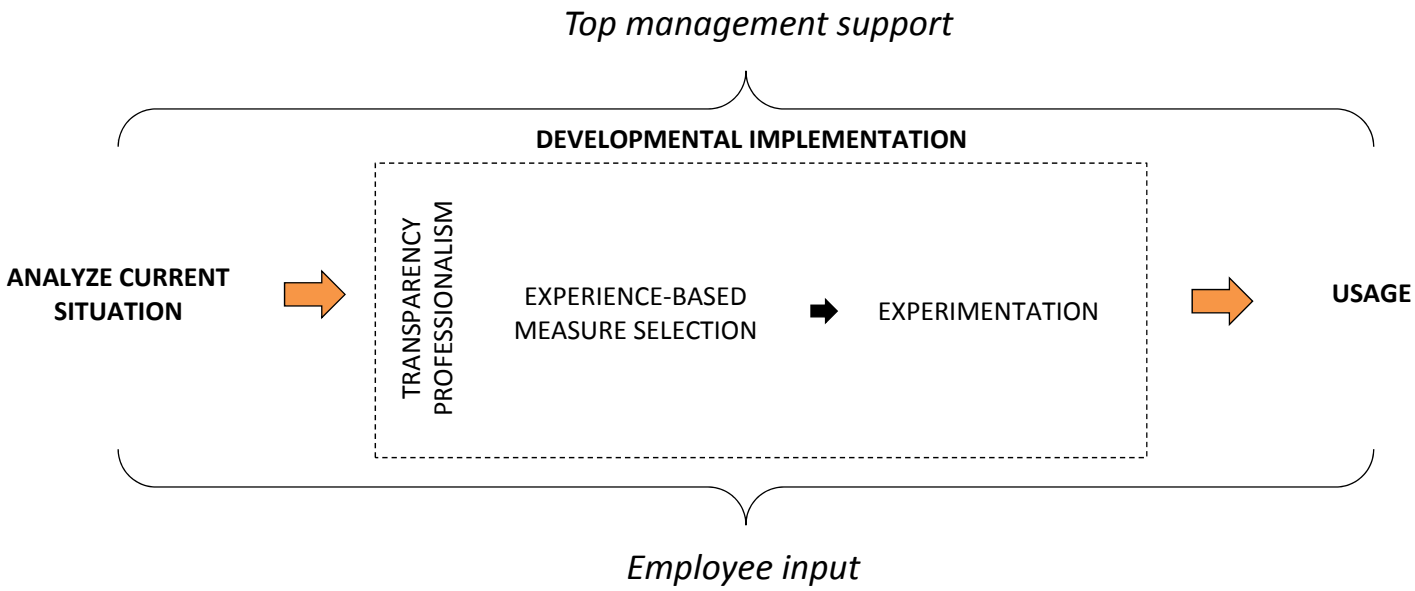


Figure 3.1. Performance measurement system implementation.

Note that the chapter assumes that prior to implementation the structure of the measures is already designed, and in the implementation phase the actual measures are chosen and defined. This is done by first analyzing the current state of performance measures in the organization, and then starting to define the new measures based on what the organization already has. The process should be started from a professional division which has the ability to develop performance measures based on knowledge provided by experience, and the ability to experiment with the measures and thus further develop them. The process should be backed up by transparency, meaning that all actors have an understanding of the process and the measures, and communication should be ensured to support this. According to Sink and Smith (1999), the difficult part of implementing performance measures is getting the top management to actually use them. In the end, success of the implementation can be measured by how well the leaders and managers are connected to the performance measurement system.

3.1.2. Enabling use of performance measurement systems

Control is said to be enabling when managers feel that it enables their work, rather than constrains it. The process of making performance measurement systems enabling relies on four features: repair, internal transparency, global transparency and flexibility. Next, these will be defined and discussed in the context of performance measurement systems.

Eker and Eker (2009) have stated that “management control systems must have a structure which supports the flexible organizational culture taking organizational change and adaption as a base in the emerging new production and competition conditions.” Waggoner et al. (1999) even argue that “...a performance measurement system is of no use if it is not able to adjust itself to changes in today’s competitive environment”. This process of improving and changing the measurement system is linked to what Adler and Borys (1996) call repair.

Repair refers to the ability of the owner of the measure to modify it. The analogue drawn by Adler and Borys (1996) is a machine operator whose machine breaks down. A coercive form of control would lock the control panel of the machine shut, and call a technician to repair the machine. The operator sees this as mistrust from the management, and cares little for improvements in the process aiming to avoid breakdowns. An enabling version of this would be increased training for the operator to be able to handle breakdowns, and improve processes in order to avoid them. Adapting the concept of repair to performance measurement would be that measures are not only imposed by the management onto the employees, but the employees would be able to modify and improve measures to better reflect their performance.

Kaplan (1994) has also emphasized that using the balanced scorecard, which in this case can be likened to any other performance measurement system, is an ongoing management process. He points out that it is an iterative process where first the senior management translates its strategy into objectives, after which the measures will be identified. At this point the strategy becomes more defined and clear to the people it affects, and it needs a new confirmation from them, which may in turn affect the strategy. For example, if earlier the strategy was that the firm wants to be the best in customer service, this could have meant accurate deliveries to one manager, and flexibility in the sense of prioritizing emergency orders to another. When the strategy is translated into measures, these assumptions will be made explicit and the strategy needs to decide if it aims for accurate or flexible deliveries.

Some authors have argued that the repair activity should be formalized. According to Kaplan (1994) the objectives and measures should be reviewed at least annually, as part of the strategic planning process. Lockamy and Cox (1995) echo this, arguing that the continuous evaluation of strategic objectives must be done to identify changes in customer expectations or other market conditions for making the necessary adjustments in objectives, metrics and/or organizational focus. This evaluation should be backed by a formal process, through which managers and employees can provide inputs for the assessment. McKenzie and Shilling (1998) add that this holds for the incentives attached to the system as well.

Waggoner et al. (1999) have identified four categories of influences that affect the changes and evolution of performance measurement systems and would thus trigger repair. These are internal influences, external influences, process issues and transformational issues.

Internal influences cause changes in the performance measurement system when for example the dominant group of people changes in the firm, causing power relationships to change. Since the measures used are typically a reflection of the interests of the dominant coalition, with the change of that group the measures should also change. Other internal influences may be peer pressure and search for legitimacy. (Waggoner et al. 1999)

External influences refer to changes external to the firm, which force or make possible to change the performance measurement system. For example changes in legislation could force the firm to start measuring its environmental impact. Also the nature of work has changed during the last century, and some measures that would have been used a few decades ago would be irrelevant in the modern world. Also the possibilities brought up by information technology have caused changes to how firms measure performance. (Waggoner et al. 1999)

Process issues include manner of implementation, management of political processes, innovation saturation and lack of system design. The performance measurement system evolves through the way it is being implemented throughout the organization. Innovation saturation may have a negative influence on the changes done to the system: if they are seen as just another 'flavour of the month', the system will eventually lose its effectiveness. (Waggoner et al. 1999)

Transformational issues are the forces within the organization that affect change efforts made. These include the degree of top-level support, risk of gain or loss from change and the impact of organizational culture. For example if the organizational culture discourages risk taking, a successful change in performance measurement systems may be blocked. (Adler and Borys 1996)

Internal transparency refers simply to the persons' understanding of the procedures they fulfill in the organization. In the previous example, internal transparency would mean the operator understands the workings of the machine, and its mission. Coercive control lacks internal transparency because the employee is not expected to understand the machine he operates, just required to use it. In performance measurement context internal transparency relates to the concept of performance measures being understandable. When a manager or an employee understands the measure, he also understands what is required from his work. (Adler and Borys 1996)

Whereas internal transparency refers to the knowledge of the internals of a process a manager or an employee works on, global transparency places that process into the context of other processes in the organization. Global transparency gives a manager a sense of belonging in the broader scope of the organizational activity. Performance measurement systems should thus be able to link the measures of one person to the measures of the company in order to be enabling. (Adler and Borys 1996)

The fourth feature of enabling control is flexibility. Flexibility means that users can make controlling decision after enabling systems have provided information, that is, the system does not limit them, but gives them freedom by offering information related to the situation. The user still has control, but the system may make him or her make better decisions. (Adler and Borys 1996; Wouters and Wilderom 2008)

In summary, the way enabling control allows the PMS to remain dynamic and adapted to the competitive environment is through relying on the knowledge and experience managers and employees have of their tasks, and the meaning of their jobs to the whole organization. This knowledge is utilized via repair to further develop and adjust the PMS.

3.2. Performance measurement process

A generic view of an organizational process typically involves inputs, processes and outputs. Inputs are what are required to create a product or service, the resources that are consumed. Typical inputs are time, material, information, energy and labor. Processes include the activities required to transform inputs into something of value. Typical processes are melting, assembling, calculating and analyzing. The results of processes are called the outputs or outcome. Output may be for example new information, a finished product, an intermediate product or a carried out service.

A way to study performance measurement is to examine how it ties into this process model. Simons (2000) has presented a model for incorporating performance measurement into this process. In addition to inputs, processes, and outputs two new terms are used: standards and feedback. Standard or target refers to a formal presentation of performance expectations. Standards are what the outputs of a process are compared to in order to evaluate them. Information of an output without a reference point, standard, is of little use. (Simons 2000)

Feedback is the information flow to the earlier stages in the process model of the variance from the standard in output. Feedback is the key to gaining control of the process, and it is where the performance of the process is communicated. Adjustments and changes can then be made using the information provided by the feedback in order

to make the process perform better. Together, inputs, processes, outputs, standards and feedback form up the cybernetic feedback model, pictured in figure 3.2. (Simons 2000)

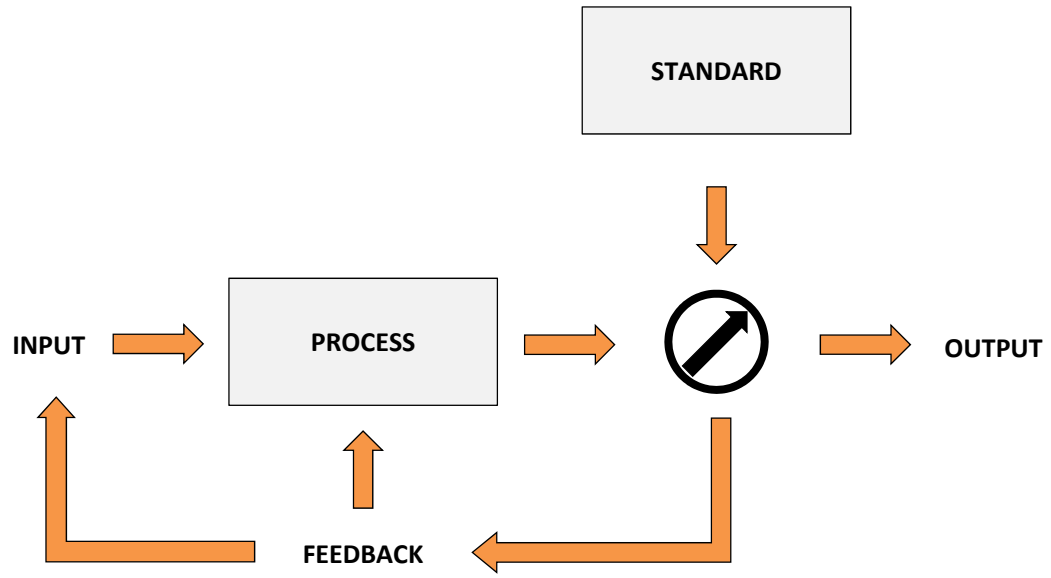


Figure 3.2. The Cybernetic Feedback model (Simons 2000)

The cybernetic feedback model can be used to demonstrate the way performance measurement works in practice. Inputs are fed into the process, which produces outputs. These outputs are measured and compared to the set standard. Information about the variance from the standard is then fed back into the system, making adjustments accordingly into inputs and processes. The processes of setting standards and feedback are now discussed in detail.

3.2.1. Target setting process

As previously noted, a part of the basic process of performance measurement is setting standards. Standards, also referred to as targets are what the performance is being monitored against, and on which performance is then evaluated and incentives are possibly given. Goold and Quinn (1990) recommend separating longer term targets from the shorter term ones. There should be objectives for longer term, but also short-term milestones that guide towards the objective and make possible the evaluation of progress. For the purposes of this thesis the term strategic objective is used to refer to the long term strategic higher level goals of the management, whereas target is used to refer to the lower level objectives set to achieve strategic objectives, and against which performance measurement data is compared (Figure 3.3). There are numerous guide-lines for target setting offered in the literature, and in this section the most relevant of them will be covered.

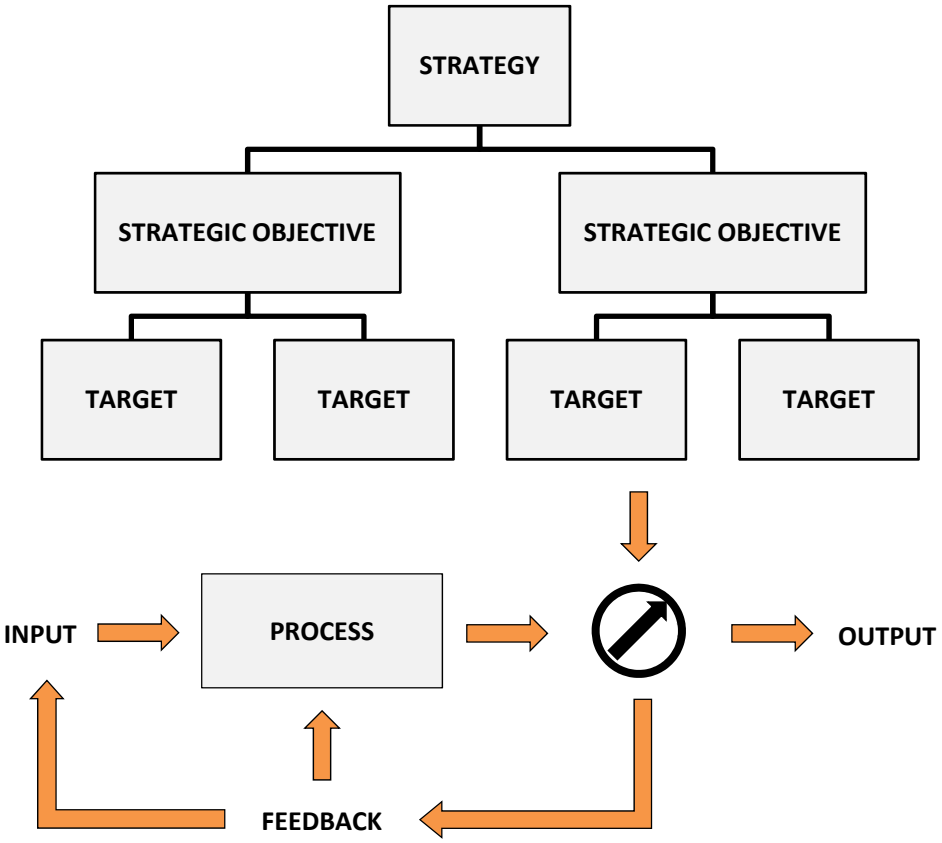


Figure 3.3. Target setting as a part of the cybernetic feedback model.

Goold and Quinn (1990) argue that a main reason for establishing performance measurement systems is to make managers personally motivated to achieving the organization's strategic objectives. In aligning these objectives of the organization and individuals, setting targets plays an important part together with the incentives or sanctions that are linked to them.

There is a consensus that targets should be specific instead of vague. Specificity means that the targets can be objectively measured. In order to be objectively measurable 'results'-oriented measures are recommended by Hirst (1987). Results orientation, as opposed to actions orientation, means that the target will be set in terms of the result wanted, not the actions needed to achieve the result. Results-orientation leaves more freedom for the subordinate to manage the task in a way he sees fit, and also enables the manager to focus on key results and major management tasks instead of going into detail on the subordinates work. Goold and Quinn (1990) state that results should be defined in competitive terms. That is, if the competitors are growing revenues by 10% annually, a target of 5% would be unsatisfactory. Therefore, a competitive target would be to outperform the competition by 5%.

In addition to targets being specific, they should be few. With too many targets for one person the risk of them being contradictory and less effective grows, and in

consequence too sophisticated management systems may fail. (Goold and Quinn 1990) Indeed, McKenzie and Shilling (1998) have also argued that too many targets reduce focus, and having too many measures without prioritization may make all of them non-effective. As a suitable number McKenzie and Shilling (1998) mention that one target is too few, but six or seven are too many. The targets selected for a person should also be prioritized to direct effort. A manager cannot be expected to outperform the competition in all areas. McKenzie and Shilling (1998) bring up an example of the risk of using benchmarking for different targets: if the managers and employees are benchmarked on inventory turnaround with the best firm in industry, as well as on product customization with the best of industry in that measure, the employees may feel confused and the targets will be ineffective.

The difficulty of targets set is an important factor in how they are perceived and in how the person performs. More difficult targets are associated with better performance, as they challenge people more. There is, however, a balance to be sought here, as too difficult targets will turn people off and lead to reduced performance. The manager should accept the target that is set for them. This balance of setting just difficult enough targets to not set people off is commonly called "stretch targets". The term implies that the target is set so that the person is just able to achieve it by stretching. (Goold and Quinn 1990) Figure 3.4 illustrates the relationship between target effectiveness and difficulty. However, sometimes it is not easy to define 'stretch' targets. Consider achieving greater customer orientation as a strategic objective. First of all, setting a quantifiable target would be difficult. Moreover, considering how that target would be 'stretched' would also be a challenge.

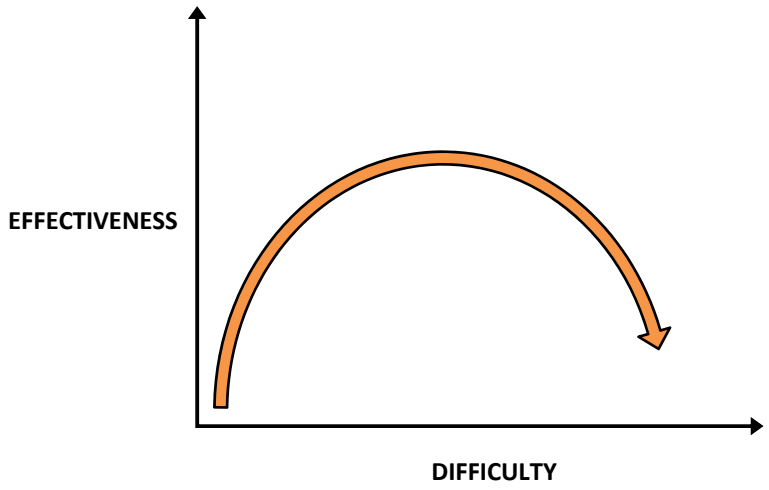


Figure 3.4. Difficulty and effectiveness of a target.

Target setting processes are generally divided into categories: top-down and bottom-up. Here top-down target setting refers to targets set individually by the manager to his subordinate, whereas bottom-down approach means target setting in co-operation by the

manager and the subordinate. The method of target setting has an impact on perfor-performance. Goold and Quinn (1990) summarize the matter so that generally the fact that the subordinate participates in target setting does not improve his performance on the task, but in complex tasks the subordinate may perform better, if he participates in target setting. This happens through better understanding of the task and how to approach it.

It is also recommended that objectives and constraints should be separated from each other: objective might be to achieve 15% shorter lead times, and a constraint that the inventory value should not grow. (Goold and Quinn 1990) McKenzie and Shilling (1998) echo this by warning about using the balanced scorecard, which in this case can be replaced by any other performance measurement system, as a basis of incentive plans, because if the manager or employee gets his or her incentives based on a set of measures, it may lead to a situation where he or she underperforms in others, and succeeds in others, and still receives a significant payout. In some case it might lead to a situation where the manager succeeds in shortening lead times, but has built up excess inventory. In this case, one could doubt whether bonuses should be paid at all. To counter this, firms should adopt thresholds on certain targets before payouts can occur. In the previous example, a threshold or a constraint could have been that the inventory value may not increase over x percent. Moreover, payouts should not be "all-or-nothing", meaning programs where bonuses are a fixed sum, paid when the threshold is reached. This, according to McKenzie and Shilling (1998) will only lead to either irrelevancy if the manager considers the target unattainable, or lack of effort and push once the threshold is reached. The difference between fixed and gradual incentives for achieving performance targets is illustrated in Figure 3.5.

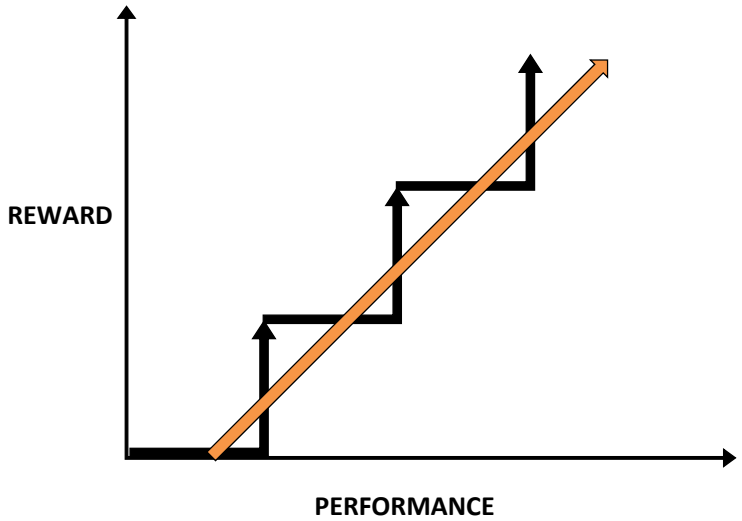


Figure 3.5. Gradual and fixed payments for performance.

According to McKenzie and Shilling (1998), purely financial, high-level targets often fill many of the characteristics of a good target, but they lack in their ability to motivate. The problem is that such targets as net income growth are often too far removed to effectively motivate lower-level managers and employees. Using purely lower-level financial targets may cause problems as well. Since the financial numbers are often based on the accounting processes, allocations and transfer pricing, they can lead to disagreements inside the company and focus attention on accounting instead of performance. McKenzie and Shilling (1998) also argue that financial targets may lead to short-term thinking. The reasons for this have been explained in chapter 2.1.3. Goold and Quinn (1990) support this by saying that both financial and non-financial targets should be set.

3.2.2. Feedback process

To clarify the feedback process, a model proposed by Sink and Smith (1999) is used (Figure 3.6). The model consists of three parts: who is doing the leading and managing, what is being led and managed and what we manage with. Between these, there are three interfaces: the measurement-to-data interface, the information portrayal-to-information perception interface and the decision-to-action interface. They argue that for any management system, the goal is to optimize the performance of the next-larger system. That is, for a production line manager the goal is to optimize the performance of the factory, for the factory manager the goal is to optimize the supply of the organization, and for the supply manager the goal is to optimize the supply chain, and so on.

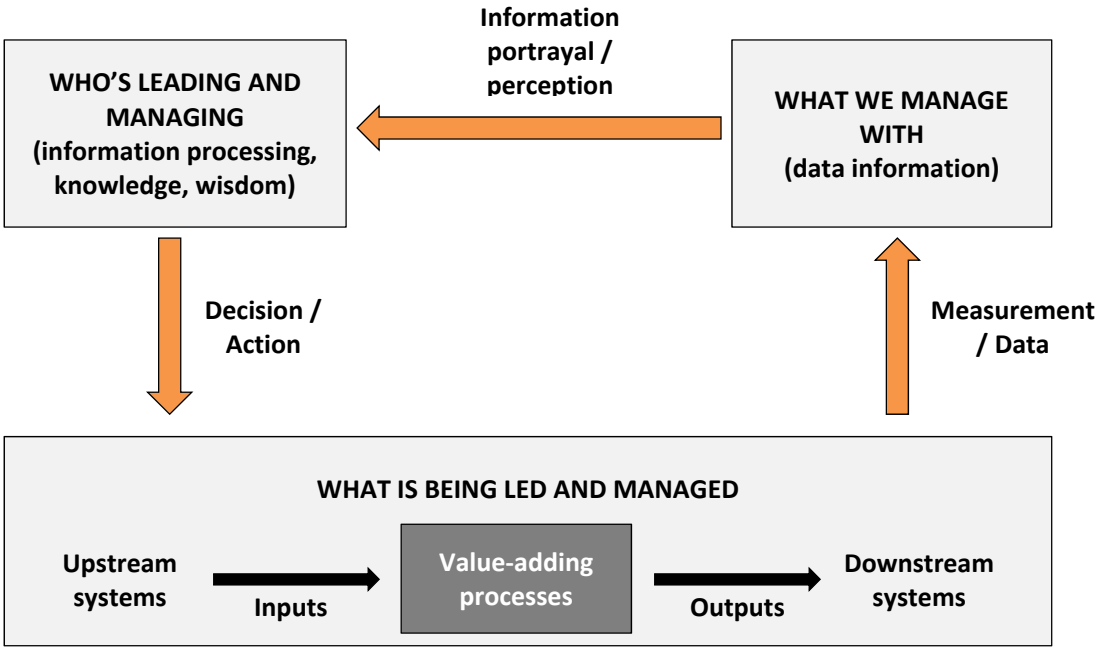


Figure 3.6. Model for performance feedback systems. (Sink and Smith 1999)

Using the above model, the feedback process could be described as follows: first, the data will be collected in the measurement-to-data interface, then analyzed and compared against the standard, after which the analysis will be reviewed in the information portrayal-to-information perception interface. After this, the managers next process the information with the knowledge they have, and make decisions impacting the process that originated the data. Figure 3.7 illustrates how the model fits into the cybernetic feedback model.

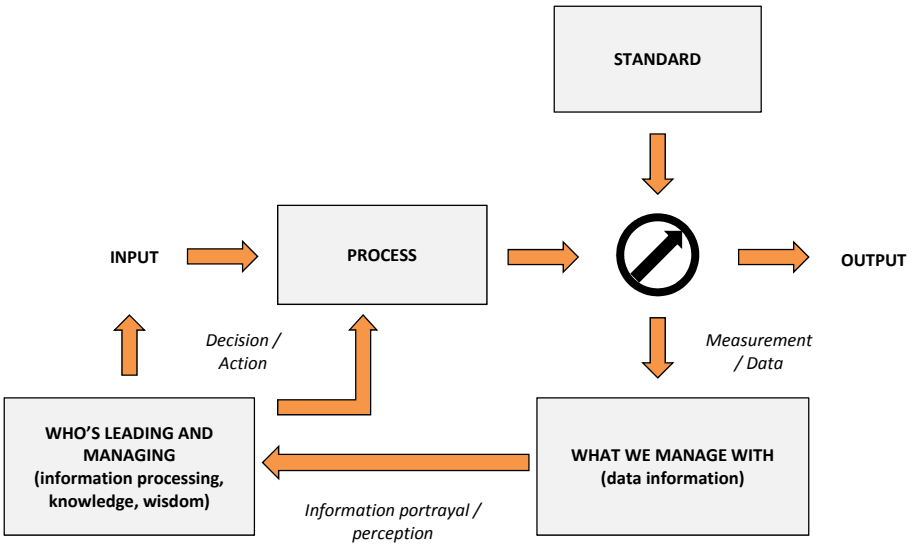


Figure 3.7. Feedback systems as a part of the cybernetic feedback model. Adapted from Simons (2000) and Sink and Smith (1999).

According to Crawford and Cox (1990) performance must be measured in ways that are simple to understand by those who are being evaluated. They even argue that performance data should be collected by the ones who are being evaluated. This is because the employees need to understand what they are evaluated on, and what kinds of changes are needed to improve on the measures. By giving the responsibility of data collection to the employees, it forces the measures to be simple enough, and also forces the employees to use the measures. It also makes the performance evaluation data more reliable to the employees.

In the analysis, or "what we manage with" -phase the data is compared to set standards and converted into information. Feedback information should flow in two dimensions: vertically and horizontally. Vertical flow of feedback information refers to the flow of information between organizational levels. As has earlier been stated, strategic objectives should flow from company strategy to the plant level. The exchange of feedback information between levels of organization is part of creating organizational focus towards the objectives. This process can be facilitated by creating formal interactions and reports between organizational levels. (Lockamy and Cox 1995)

Horizontal flow of feedback information refers to the flow of information between functions such as procurement and sales on an organizational level. This is to promote organizational focus within the organizational level. A performance measure is seldom affected by only one function even though it might be owned by that function, and therefore it is important to ensure support from other functions as well. For example, manufacturing lead time might be the responsibility of production manager, but the support of procurement to get the materials on-time is needed for success. (Lockamy and Cox 1995)

Information portrayal refers here to how the analyzed information is presented. Topics such as how will it be visualized, in what forum it will be reviewed, how often, etc. should be addressed. Crawford and Cox (1990) recommend using visual trend graphs to portray the information. They are easy to understand, and deteriorating performance is quickly identified with the aid of graphs. This information should be readily available. The need for the information to be openly available, not only tracked and stored is echoed by Gomes et al. (2006). A decision that has to be made with any report is how frequently it should be updated. The consensus on performance measurement reporting in the literature seems to be that the reporting interval depends on the kind of measure, and organization level (1990).

Lockamy and Cox (1995) propose that at the plant level, the feedback should be as fast as possible. From the moment of measurement, the relevant stakeholders should have the information with a minimal passage of time. This is to provide an appropriate level of control. At this level, measurement systems should strive to be real-time (Vorne 2007). In higher levels, it becomes more difficult to have the information as quickly: information about a product defect found at factory level is quickly acquired, but its impact to the profit and loss statement can only be seen later, when the financial data is published. Crawford and Cox (1990) who studied designing performance measurement systems for JIT operations propose that the kind of measure also affects to the reporting interval. They found that time-related performance-to-schedule measures should be reported more often, for example daily or weekly, than other measures, such as quality or inventory measures, which can be measured monthly instead.

The last phase of the feedback model, “who is leading and managing” and the decision-to-action interface will be discussed in length in chapter four. This is the phase where the performance measurement system becomes management control, and thus the concept of management control systems will be used to discuss the topic.

4. PERFORMANCE MEASUREMENT SYSTEM AS A METHOD OF CONTROL

4.1. Management control systems

In the literature there have been several different terms related to management control systems. It should be now clarified what these terms refer to, and what is the definition of management control systems used in this thesis. Management accounting (MA) consists of activities such as budgeting, cost accounting, pricing etc. Management accounting systems (MAS) refer to such use of management accounting techniques, where an objective is attempted to be accomplished. MAS would therefore include such activities as budgeting for project management. A wider view are the MCS, management control systems, which in addition to management accounting systems include other systems, which are used to manage the firm. Another term widely used in the literature, management accounting control systems (MACS), refers to MCS. (Chenhall 2003)

There are different variations of the exact definition of management control systems in the literature. For example, some authors view MCS as the systems used to direct employee behavior while others see MCS as tools of achieving goal congruence (Abernethy and Chua 1996). This thesis adopts the definition offered by Malmi and Brown (2008). They have suggested that managers may employ two kinds of systems: systems for directing the behavior of others, and systems for supporting decision-making. The former implies that the system is used by one individual to guide the actions of another. These, Malmi and Brown (2008) suggest, should be called management controls. From this follows, that complete systems of management controls can be defined as management control systems. The latter, in turn, may include similar systems but leave them unmonitored, and does not take account of achieving goal congruence within the organization, and therefore should not be called management controls.

4.1.1. Management control system frameworks

In this chapter performance measurement will be reviewed from the perspective of how it contributes to managerial control, and what its role among the various control systems managers have available is. The aim for this section is to place performance measurement systems into the context of managerial control, and explore the motivations and uses of it. First, a model for understanding management control

systems will be introduced, and then the role of performance measurement systems will be discussed in detail.

Frameworks for management control systems are numerous. Management control systems have for example been classified into bureaucratic and cultural according to their usage as formal result measurement or informal company value system. (Jaeger and Baliga 1985; Harris and Ogbonna 2011) The term clan controls used in the literature refers to the cultural controls above. (Harris and Ogbonna 2011) Another well-known framework divides management control systems into personnel, behavior and accounting controls (Abernethy and Brownell 1997). There are also other classifications, for example to input behavior and output systems (Cardinal 2001).

This thesis adopts the framework of management control systems as a package, offered by Malmi and Brown (2008). This framework is illustrated in table 4.1. It includes five types of controls: cultural, planning, cybernetic, reward and compensation and administrative controls. Cultural control in the top sets the context for the management control systems. It refers to the values, beliefs and social norms which are established in order to influence employee behavior. Next, the planning, cybernetic controls and reward and compensation controls are placed from left to right in a temporal order. Planning is the form of control, where targets are set to direct the behavior of the organization, standards are defined to define the level of effort expected, and targets are aligned, enabling the coordination of the organization. Reward and compensation controls motivate and increase the performance of individual and groups, by attaching rewards to control effort direction, duration and intensity. At the bottom, administrative control creates the structure where planning, cybernetic and reward control is exercised. It refers to organizing individuals (organization structure), monitoring of behavior and who are made accountable to for their behavior (governance structure), and defining the way in which tasks should be performed, or not performed (policies and procedures). Cybernetic controls contain four different methods of control: budgeting, financial, non-financial and hybrid systems.

Table 4.1. Management control system package. (Malmi and Brown 2008)

<table>
<tr><td colspan="7">Cultural controls</td></tr>
<tr><td colspan="2">Clans</td><td colspan="2">Values</td><td colspan="2">Symbols</td><td rowspan="2"></td></tr>
<tr><td colspan="2">Planning</td><td colspan="4">Cybernetic controls</td><td rowspan="2">Reward and Compensation</td></tr>
<tr><td>Long range planning</td><td>Action planning</td><td>Budgets</td><td>Financial Measurement Systems</td><td>Non-financial Measurement Systems</td><td>Hybrid Measurement Systems</td></tr>
<tr><td colspan="7">Administrative Controls</td></tr>
<tr><td colspan="2">Governance Structure</td><td colspan="3">Organization Structure</td><td colspan="2">Policies and Procedures</td></tr>
</table>

For the purposes of this thesis, cybernetic controls and action planning are interpreted as performance measurement systems (table 4.2). The borders of performance measurement systems are not clear, but action planning is included since an integral part of performance measurement is setting targets for the measures.

Table 4.2. Performance measurement systems as a part of the management control systems. Adapted from Malmi and Brown (2008).

Performance measurement systems				
Planning	**Cybernetic controls**			
Action planning	Budgets	Financial Measurement Systems	Non-financial Measurement Systems	Hybrid Measurement Systems

The typology presented above suits the purposes of this thesis by illustrating the wide variety of controls available to managers comprehensively, but as Malmi and Brown (2008) state, "is parsimonious enough to create boundaries for an empirical inquiry". It allows the separation of performance measurement systems from the other forms of control, and enables the discussion of its role in relation to others. It encompasses several management control system frameworks from the literature, categorized into budgets, financial and non-financial measures, hybrid measurement systems such as Balanced Scorecard, rewards and compensation controls, organizational structure and governance, procedures and policies and beliefs systems.

Simons' (1995) MCS framework, "levers of control", will also be utilized for the purposes of the thesis. It focuses on the formal control systems and divides them into boundary, belief and feedback and measurement systems. The feedback and measurement systems can be also referred to as performance measurement systems. Simons (1995) divides these performance measurement systems by the way they are used into diagnostic and interactive systems. This division by usage is the most important reason this particular framework is selected to be used in this thesis, since the thesis focuses on how performance measurement systems are used. Other frameworks in the literature concentrate on the design aspects of control systems in dividing them, but with the division into diagnostic and interactive systems, the way they are used gets attention.

4.1.2. Levers of control

Simons' (1995) framework divides management control systems into four: interactive control systems, diagnostic control systems, boundary control systems and belief control systems. The first two, interactive and diagnostic control systems form the feedback and measurement systems. Feedback and measurement systems are often referred to as the harder measurement systems, whereas boundary and belief systems are softer (Chiesa et al. 2009).

Belief systems are use of management control system in order to define, communicate and realize organizational values, meaning, and direction. The typical way of using belief systems is through documents communicating for example the vision or mission of the organization. The aim is to provide momentum and guidance to opportunity seeking behaviors. (Simons 1995, p. 178) Therefore beliefs systems can be likened to cultural controls.

Boundary systems define the limits of acceptable behavior and actions to the members of the organization. They both define how not to act, and direct the activities and possible future courses of the organization to be aligned with the strategy. There are three important functions for boundary systems (Simons 1995):

1. They help in maintaining the credibility of the firm.
2. Guide where opportunities may be sought, and where they can't be. Most firms will want to make clear that unethical opportunities are off limits.
3. They help management direct its resources better. When the management knows that the organization works within set boundaries, they can focus their attention on other things.

Boundary control can be used for example in the form of policies and procedures, under administrative controls, or in the form of budgetary control under cybernetic controls proposed by Malmi and Brown (2008). The basic idea is that if a part of the control

system package is used in order to limit the actions of an employee, it is used as a boundary control.

Diagnostic control systems are the first kind of feedback and measurement system usage. Diagnostic control systems are the traditional way of using performance measurement systems. Typical of them is the thermostatic-like way of functioning: a standard or an objective is set, the process is measured, and if a deviation is reported the problem is corrected. Diagnostic control systems are thus used when the performance measurement system is used to evaluate if the results are as planned. There are three requirements for the usage of diagnostic control systems (Simons 1995, pp. 70-71):

1. The ability to set objectives on results or performance.
2. The ability to measure the results.
3. The ability to use the feedback to correct the process.

Interactive control systems refer to the usage of performance measurement systems in such a way that the top management pays significant attention to a certain control system and in that way participate in the decision making of their subordinates. Four requirements are typically set for a control system to be used interactively (Simons 1995, pp. 96-97):

1. Information generated by the system of an important and recurring agenda addressed by the highest levels of management.
2. The interactive control system demands frequent and regular attention from operating managers at all levels of the organization.
3. Data generated by the system are interpreted and discussed in face-to-face meetings of superiors, subordinates, and peers.
4. The system is a catalyst for the continual challenge and debate of underlying data, assumptions, and action plans.

Simons (1995) thus argues that the primary usage of interactive control systems is in recognizing and countering strategic uncertainties. Managers use control most interactively in matters that demand the most attention from them, and seem most important for them.

4.2. Performance measurement systems as part of the management control system package

Performance measurement systems are only one part of the management control system package. Therefore, it is now explored what kind of relationship they have with the other control systems. Next, these interfaces between performance measurement and the other types of control in the management control system package will be discussed, using the framework presented by Malmi and Brown (2008).

4.2.1. Performance measurement systems and cultural controls

Cultural controls include values, clans and symbols. Value systems are typically used as beliefs systems. These are the set of organizational definitions that senior managers communicate formally and reinforce systematically to provide basic values, purpose and direction for the organization. Malmi and Brown (2008) discuss three levels in which value systems work: when a person with fitting values is recruited, when individuals are socialized and their values adjusted to the organizational values, and when values are explicated and the employees behave according to them, even if not agreeing personally. This suggests that performance measurement systems have a role in being the vehicle of value communication.

According to Simons (1995, p. 36), the modern business environment makes it more difficult for managers to comprehend organization purpose and direction, but beliefs systems are the way to provide them. As Simons (1995) has stated: "If managers are to transform individual abilities into cohesive organizational outputs, each individual must understand the organization's purpose and his or her contribution to that purpose". As has been discussed, management using performance measurement systems to measure certain area focuses attention, and also communicates the values of the management. They also make explicit the contribution of one employee to the aims of the organization. For example, if the management sets a key performance indicator based on customer satisfaction, it would direct the culture of the corporation towards customer-orientation. Thus, it can be summarized that management can use performance measurement systems as vehicles of cultural change in communicating values throughout the organization.

Symbols are the visible expressions, such as buildings, created to develop a particular kind of culture (Malmi and Brown 2008). An example of this would be IKEA, whose stores always look the same, and are symbolic to the firm. The connection between symbols and performance measurement systems has not been discussed in the literature.

The last form of cultural control is clan control. Clan control was developed by Ouchi (1979) and it refers establishing values, beliefs, learning and control by social processes, or rituals and ceremonies as he calls them. Rather than interacting with the performance measurement system, Ouchi (1979) argues that a firm with strong clan control culture needs no other control system. That would suggest that for companies with strong clan culture, using a performance measurement system would not be beneficial.

This idea of organizational culture impacting the way performance measurement systems are used has been researched by Eker and Eker (2009). They found that different cultural environments require different performance measurement systems. By cultural environment they refer to the system composed of values and thoughts shared

by organization members, forming the common identity of the members. They state that organization cultures can be generally categorized into two forms: control and flexible. Flexible culture emphasizes values like spontaneity, change, openness, adaptation and sensitivity, whereas control culture emphasizes predictability, stability, permanence, formality, rigidity and conformity.

A flexible culture is often associated with firms in dynamic and instable environments where changes are frequent and level of competition is high. Control cultures, on the other hand, are associated with firms in stable environments, where changes in the market are less frequent, and the competition is not that high. Managers should define organizational culture and design convenient PMS to existing organizational culture, because a system that is incompatible with the existing organizational culture can never reach any success for business. (Eker and Eker 2009)

Compatibility of organizational culture and PMS is important, because generally firms with control or flexibility cultures have different aims for using the performance measurement systems. Eker and Eker (2009) found that firms with flexibility cultures use PMS relatively more for focusing attention and strategic decision making, whereas in control culture firms PMS was mainly used to direct action and support decisions. They also argue that the use of non-financial measures is more frequent in flexibility culture firms, whereas the use of financial measures is typical in both.

It may thus be that a performance measurement system that is not tailored to the culture of the firm is more likely to fail to be implemented and used. There is, however, another view present in the literature, according to which changing the performance measurement system can actually be used to drive the process of organizational change. Simons (1995) found that new senior managers often change performance measurement systems as means of trying to implement their vision and strategy. Kaplan and Norton (1993) even argue that their balanced scorecard is most successful when it is used to drive the process of change.

Duberley et al. (2000) however found that some level of cultural unfreezing is necessary to facilitate change in performance measurement systems. Cultural unfreezing here refers to activities aimed at creating a need for a change in the organization. Indeed, it might be that there has to be a need for a change before a PMS change can be effectively utilized to drive the change, since for example in Kaplan and Norton's (1993) case examples the balanced scorecard seemed to have best performance when there already was a need for change present.

4.2.2. Performance measurement systems and administrative controls

Administrative control includes governance structure, organization structure and policies and procedures. Governance structure refers to the company's board structure

and composition, and its various management and project teams. It defines who reports to whom, responsibilities and authorities. (Malmi and Brown 2008) In performance measurement system design the governance structure has to be addressed. Particularly in the target setting and evaluation processes the reporting structures become apparent, and have an impact on the performance measurement process.

Organization structure has not traditionally been thought of as a control system, but Malmi and Brown (2008) argue that since it is a feature of the organization that the managers can change, it should be included into the package. Organization structure has significant impact to the types of contact and relationships the organization's members have (Abernethy and Chua 1996). The relationship between performance measurement systems and organization structure seems to be one-way. The link between these two control systems can be seen as organization structure defining performance measurement system's structure. For example, a manager typically measures the subordinates' performance. The performance measurement system in that sense has to adapt to the way the organization is structured.

The final form of administrative control is the use of policies and procedures. These refer to for example the rules, behavioral constraints, and standard operating procedures managers use to direct the behavior of their subordinates. (Malmi and Brown 2008). Simons (1995, p. 39) discusses boundary systems, which "delineate the acceptable domain of activity for organizational participants." As discussed in chapter 3.2.1, it is recommended that in setting targets, the constraints are explicitly separated from the targets. The relationship between performance measurement systems and policies and procedures, therefore, is that the policies and procedures act to support the performance measurement system, and to prevent it from being misused.

4.2.3. Planning, cybernetic and reward controls

The three remaining control systems, planning, cybernetic and reward controls are tightly linked and will be discussed together. In this thesis the definition of performance measurement system includes action planning and cybernetic controls.

Budgets, and financial, non-financial and hybrid measurement systems form the basis of performance measurement systems, as they are the way to quantifying the efficiency and effectiveness of an actor, or the outcome of action (Neely et al. 1995). Malmi and Brown (2008) state that cybernetic control is the process of attaching a system to monitor how targets set for action plans in the planning process are achieved and the feedback loop that make cybernetic controls a management control system. Thus, the role of cybernetic controls is to act as a basis for performance measurement systems as a management tool for control.

Long-range planning controls relate strongly to the target setting process. Strategic plans are made and objectives met, and through setting targets, milestones to be achieved, the action planning process links the long-range planning to cybernetic control. The cybernetic controls support in achieving the planned objectives and targets. The purpose of setting targets is to direct effort and behavior, provide standards to be achieved, and make clear the level of effort and behavior expected and enable goal congruence. (Malmi and Brown 2008)

Reward and compensation controls' role is to motivate managers to put increased effort towards achieving the targets set in the planning process. According to Malmi and Brown (2008), much of the research on reward systems has focused on monetary and other extrinsic rewards, even though intrinsic rewards belong to the controls as well. Bonner and Sprinkle (2002) found that monetary incentives increase effort and performance through focusing individuals' efforts on the task. This happens in three ways: effort direction, i.e. the individual focuses on the task rewarded for, effort duration, i.e. he individual spends more time on it, and effort intensity i.e. the individual pays more attention to it. Malmi and Brown (2008) note that the role of supporting cybernetic and planning controls is not the only role of rewards and compensation, as they can be used as a method for control separately as well.

4.3. The role of performance measurement systems

The findings of the previous chapter are collected into table 4.3. Performance measurement systems are often cited as being decision making support systems. Hall (2010) proposes that managers do not typically use the information produced by performance measurement systems as an input to specific decisions to be made, but rather to develop knowledge of their work environment and focus on specific operational concerns and to discuss and debate the meaning and implications of accounting data. This is often triggered by performance measurement system signaling that an issue should be investigated further. He argues that for this role, the information has to be simple and easily understood.

Malmi and Brown (2008) would argue that the prior use of accounting information mentioned by Hall as developing knowledge of the work environment is not a management control system at all, but rather a management accounting system. They require that the system is used for directing behavior. The second one, signaling of issues needing attention, and a vehicle for focusing attention on specific concerns, fill the requirement of directing behavior. The processes of signaling and managerial attention focusing relate to Simons' (1995) concepts of diagnostic and interactive uses of control systems.

Simons' (1995) diagnostic control relates to the action planning process, since in the planning process the standards or targets for the measurement system are set. The diagnostic control system then monitors results, comparing them to the set standard. If a variation is registered, the system alerts, the reasons for the variation will be found out and fixed. Simons (1995) has used the analogue of a thermostat: it is given a standard of the wanted temperature. If it notices a change in the temperature, it adjusts the heat towards the standard. Similarly, when a manager gets a report that the order intake for the year is lagging behind set target, he tries to find the reasons for it and correct the situation in order to meet his target. This often triggers interactive control.

Sometimes focused attention is needed, and the manager cannot remain passive and monitor the incoming reports. In the previous example, the diagnostic system triggered the manager to start using the performance measure of order intake interactively. The manager would discuss with his subordinates about the worrying order intake numbers, and require that the reports come as soon as data for the month is analyzed in order to keep him in track and to discuss and debate the reasons for the problem. Hall (2010) argues that performance measurement systems used actively implies often verbal communication. He explains that "verbal forms of communication allow managers to tailor accounting information to specific operational concerns, and provide a context to debate and discuss the meaning and implications of accounting data".

Any control system can be used interactively, including performance measurement. Interactive control of a performance measure "focuses the attention of the entire organization on the area where the senior manager is focusing his or her personal attention." Important is the personal nature of interactive use of performance measurement information: managers discuss and debate with their subordinates face-to-face. By using performance measures interactively, managers initiate a process, where the strategic uncertainties will be explored, discussed, learned of, and finally translated into strategic actions. (Simons 1995, pp. 91-124)

One of the reasons that motivate the manager to act this way are the reward and compensation controls, which in the first place have focused the manager's attention towards the measure of order intake. He is also more likely to spend more time on it; especially if the diagnostic control system alerts that the target will not be met. Through interactive use of the control system, he then not only spends more time on it, but also pays more attention to it, even when making decisions not directly related to order intake. (Bonner and Sprinkle 2002)

Cultural controls play a part by directing the target setting areas. By setting order intake as that manager's target, the organization has communicated that future growth is a strategic objective of the company. This kind of strategic objective also communicates the values of the firm, which might in this case include growth. If clan controls are

strong, which might be the case in smaller companies (Simons 1995, p. 34), organiza- organization might not need or be able to gain value from formalized ways of communicating values. Simons (1995, p. 34) argues that "as organizations grow and mature, however, defining and communicating a unified purpose becomes both more important and more difficult". Ouchi (1979) suggests that clan control is best suited for organizations in situations where the ability to forecast the means-ends relationship is low and the measurement of the organization's outputs are difficult.

Finally, the administrative controls define in many ways how the performance measurement systems will be organized. Reporting structures and authorities define who does the target setting, who does the evaluation of targets being achieved, who revises the measures if needed, etc. They also impact how data collection, analysis, portrayal and decisions are made. In the previous example it might have been that the data for low order intake was stored in the organization's information system, and analyzed and reported to the manager by the organization's centralized general reporting function. In some other organization the function reporting might have been sales support. The policies and procedures set in the corporation define the boundaries within which the targets should be achieved. The manager might have been set constraints of not giving more than x percent in discounts while pursuing to reach the target for order intake.

Table 4.3. Performance measurement systems as a method of control. Adapted from Malmi&Brown 2008.

<table>
<tr><td colspan="4">Cultural controls</td></tr>
<tr><td colspan="2">Clans

- Replace formal control systems if strong</td><td colspan="1">Values

- Can be communicated via performance measurement systems</td><td>Symbols

- Not related</td></tr>
<tr><td></td><td colspan="2">Performance measurement systems</td><td></td></tr>
<tr><td colspan="2">Planning</td><td rowspan="2">Cybernetic controls

- Diagnostic control through alerts of variations
- Interactive control through dialogue and focused attention
- Support planning</td><td rowspan="2">Reward and Compensation

- Support planning
- Support cybernetic controls</td></tr>
<tr><td>- Set strategic objectives</td><td>- Set targets for achieving strategic objectives</td></tr>
<tr><td colspan="4">Administrative Controls</td></tr>
<tr><td>Governance Structure

- Impact planning and feedback processes</td><td>Organization Structure

- Impact performance measurement system structure</td><td colspan="2">Policies and Procedures

- Prevent performance measurement system from being misused
- Set constraints to achieving targets</td></tr>
</table>

In summary, it is interesting to notice that the performance measurement system design principles of integrity and deployment seem to be important to the interplay between different control systems. It is only through deployment that strategic objectives created in the long-range planning controls can be translated to action plans and targets in the lower levels of the organization. It also requires the integrity of the organization in order for the whole organization to be aligned to achieve the strategic objectives.

The set targets are then fed into the cybernetic controls, which supports the achievement of these targets by diagnostic control, alerting of variations in the process. They also focus attention on strategic uncertainties with interactive control. Reward and compensation systems support the system by motivating the individuals to focus their efforts toward the targets.

Cultural controls may limit the value of the performance measurement system, if the performance measurement system does not fit into the organization's culture, but the performance measurement system can be used to change, and communicate the organizational culture in the case that the management recognizes a need for cultural change. Deployment of the performance measurement system becomes important, because if the PMS is not able to deploy top level messages to lower organizational levels, cultural change will not be communicated.

Administrative controls mainly impact the way performance measurement systems are organized, but also support the system by setting rules to prevent the misuse of the system, and constraints to the ways in which targets are pursued. The performance measurement system needs to be able to fit into the organizational structure, meaning that it has to conform to the structure of organizational levels and functions. A performance measurement system that can accomplish this would fill the criteria of integrity and deployment discussed in chapter 2.2. In a way administrative controls set the challenge for integrity and deployment – the performance measurement system must be able to integrate and deploy through the organizational and governance structures. Another task of the administrative controls is to prevent the performance measurement system from being used inappropriately. A performance measurement system might be tricked by for example keeping machine utilization high by using inappropriate or inefficient working processes or machine operation. This kind of behavior must be limited with boundary control through policies and procedures. It has also been discussed that targets and constraints should be separated. Policies and procedures might include constraints that define the way managers are allowed to act in the pursuit of achieving targets.

5. CONTEXT AND CURRENT SITUATION

This chapter introduces the case organization, and the starting point for the design and development of the performance measurement system and its usage process. The information has been gathered through meetings and semi-structured interviews of two controllers of two business units of the organization, and from interviews with two manufacturing vice presidents, as well as from scanning the internal documents such as performance measurement templates, definitions, data, and review materials, as well as documents such as strategy communications. The interviews followed roughly the same format, where first questions regarding the processes of the unit that the person represented were asked to gain understanding of them, and then the efforts made to develop the performance measurement systems in these organizations were further explored. Finally, the interviewees were asked for their vision on how they would see the ideal performance measurement system in the future.

5.1. Organization and performance measurement system stakeholders

In this section the case organization will be discussed, and the context for the PMS to be developed will be defined. The most organized activities for establishing an integrated performance measurement system in the organization have been executed in two of the organization's business units and their plants, and these will be reviewed in order to gain understanding of the efforts done so far, and the systems currently in place.

The case organization is a business line of a large global company, which engineers, manufactures, and distributes capital equipment. Case organization handles the spare and wears parts and services business, along with other services such as process optimization. The case organization is a business line of a company organized as a matrix of the business line on one dimension, and market areas on another. Conceptual illustration of this is presented in table 5.1.

Table 5.1. Case company's matrix structure.

	Case organization		
Market area			

The case organization is a combination of product line business units, and global functions such as distribution and pricing. Next, the organization will be discussed in more detail. Even though market areas are not part of the same organization, they have a significant effect on the actions and results of the case organization, and for that reason they will be briefly introduced.

5.1.1. Market area

Market areas are headed by regional senior vice presidents. To these report the country/area-specific VPs and managers of the sales organizations. The regional SVPs report directly to the company president. The organization structure is presented in Figure 5.1.

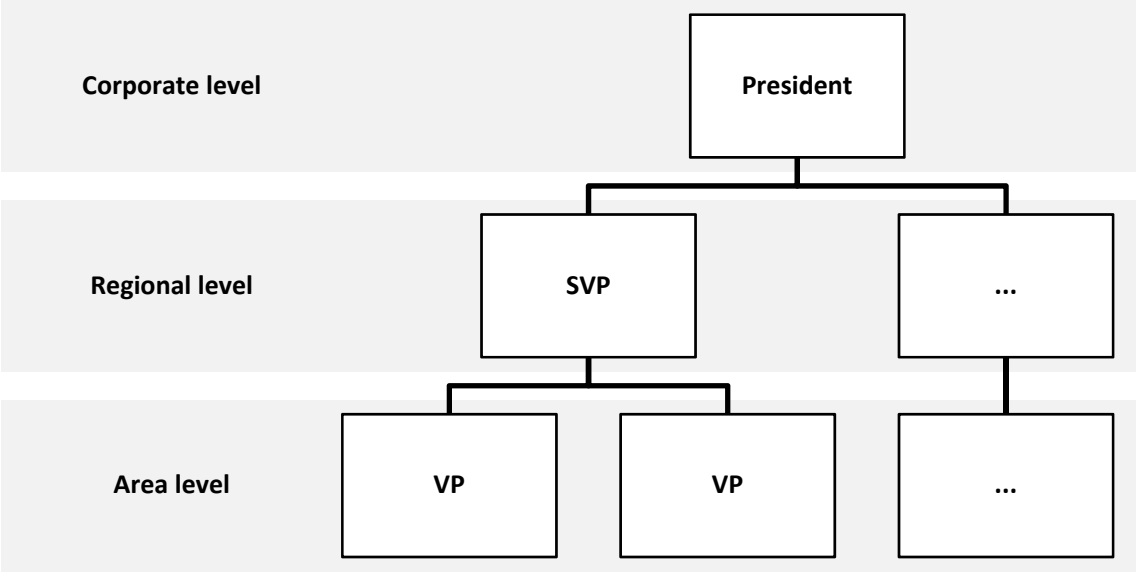


Figure 5.1. Market area organization.

Market area is responsible for the order intake, and has no profit responsibility. This thesis is done for the product line side, and thus the market area organization is not considered in further detail.

5.1.2. Product line and global functions

The organization structure is illustrated in Figure 5.2. The case organization consists of four organizational business units, of which two own plants. These two business units will be the focus of the discussion here, as they are also the ones undergoing the developments towards implementing performance measurement systems.

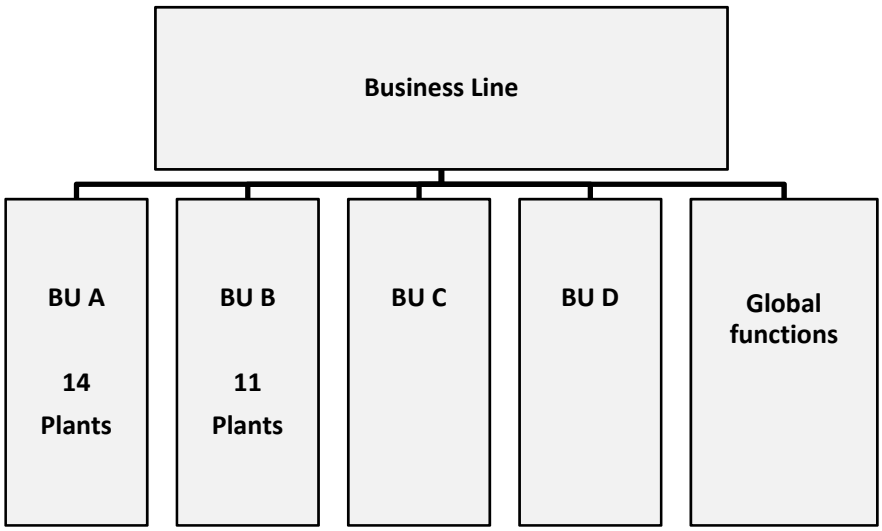


Figure 5.2. Case organization structure.

Business units are headed by the business unit (BU) senior vice president (SVP) (Figure 5.3). BU SVP is responsible for the financial results of the corresponding business unit overall. This includes sales, manufacturing, research and development, assets and other activities related to the particular business unit. To him/her report several product line heads and operations heads, titled vice presidents (VP). To the product line vice presidents report product managers and product support managers. To the business unit SVPs also report the business unit controllers, as well as the manufacturing VPs. For example, business unit A has a manufacturing vice president for type A plants and another for type B plants. The plant managers report to the manufacturing VPs.

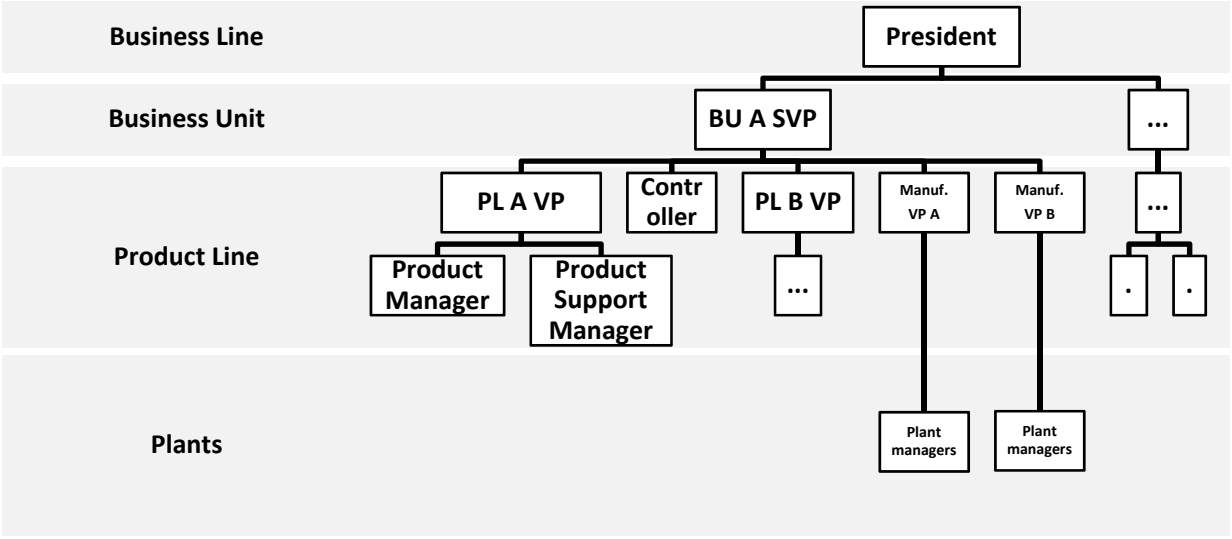


Figure 5.3. Product line organization.

Plant working environment for business unit A was explored through interviews of the controller for BU A, and the manufacturing VPs for the plants of BU A. Having own manufacturing plants is very important for the case organization in order to preserve knowledge of the product range, diversify manufacturing locations globally, develop products and processes and improve control and management possibilities.

There are two main categories of manufacturing plants within the business unit. Nine of the plants will be here referred to as type A plants and five type B plants. Type A plants produce cast parts, often made from different metals or composite materials. These parts are standard items which can usually be produced in any of the type A plants, but an exception to this are the largest and most complex parts, which can only be produced in one or two of the plants. For the rest of the cast items, a typical management decision would be where to produce a certain part for a certain order.

The working environment for type B plants parts is different. The items are not all standard parts, but a mix of make-to-stock, make-to-order and also engineered-to-order. A large part of the production is made up by make-to-order and engineered-to-order. All of the organization's type B products are designed and produced in-house. The business for type B plants also differs from type A plants in that sense that where the products of type A plants can be produced usually in any of the type A plants, type B items are practically always produced in the nearest location available.

The working environment for plants is such that the distribution centers have estimates of the next months' demand based on moving average forecasts in the ERP. Those estimates are then translated into orders from the plants. The plants produce on this

basis, and deliver the products to either the distribution center warehouses in the case of type A plants, or sometimes in the case of type B plants directly to the end customers.

The plants do not follow a consistent manufacturing philosophy such as lean, JIT, or TQM, but have adopted some basic principles such as low inventories, and manufacturing based on real orders from the distribution center. Typically the visibility into type A plants has been greater than into type B plants, which the controller attributes to the local nature of the type B plants business. All plants have the company-wide global ERP in use, but the nature of usage is not currently seen as supportive of a performance measurement system. This is due to the history of the ERP implementation, as controller of business unit A stated: "sadly, the local users were given freedom on how to use the system, which has resulted in varying, non-harmonized processes and data."

Reporting to the president of the case organization are also several global support functions (Figure 5.4). In the scope of this thesis are pricing, supply operations, inventory management, transportation & warehousing, procurement and order desk. Their task is to support the product lines and market areas in their function globally. The global functions have no profit responsibility.

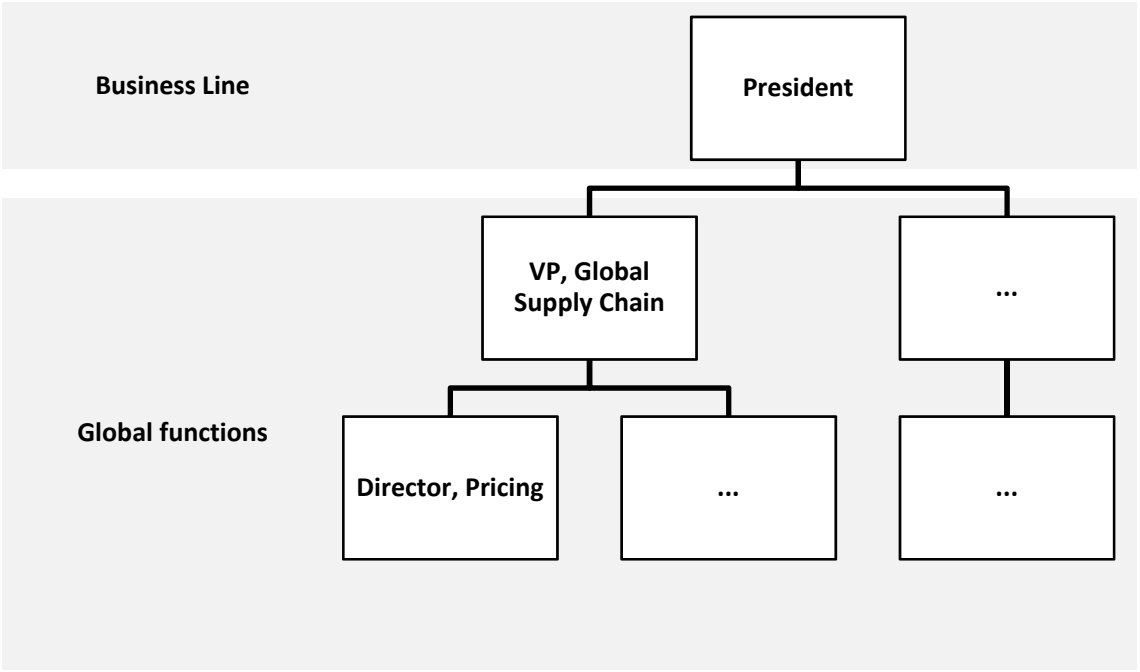


Figure 5.4. Example of global functions organization.

The research performed for this thesis included meetings with senior vice president for business unit B, supply development manager, a controller from another business line who had been developing their performance measurement systems, controllers from both BU A and B and the manager of the performance measurement system project for SBL, vice president of global supply chain. In addition to the meetings several in-depth

interviews were arranged with the manufacturing vice presidents for BU A and the con-controllers for BU A and BU B. The understanding of the topic and the requirements set for the performance measurement system were also gained through hallway conversations with product line representatives for BU A and members of global functions.

Business unit A and B were chosen to be the focal point of the thesis. The model that will be developed for the performance measurement system and its usage will, however, be applicable for the whole organization. This is because it is not the intention of this thesis to design the exact set of measures, but rather design the framework, and then describe the process of developing the system and its usage.

5.2. Current performance measurement systems

The historical situation in the case organization regarding to performance measurement systems is that there have been no integrated, organization-wide systems. Indeed, a quote from Kaplan and Norton (Kaplan and Norton 1993): "Clearly, many companies already have myriad operational and physical measures for local activities. But the local measures are bottom-up and derived from ad hoc processes" seems to hold for the case organization. In this thesis, the controllers of business units A and B were interviewed on the development efforts done for the performance measurement systems for these business units.

5.2.1. Performance measurement in business unit A

The controller for BU A (from here on referred to as C-A) joined the organization in 2007. Back then there was practically no integrated performance measurement system in place. Plants measured their own performance in ways not documented and not known at this level of the organization. The need for increased visibility into the plants was recognized. A performance measurement system was decided to be implemented with three main objectives:

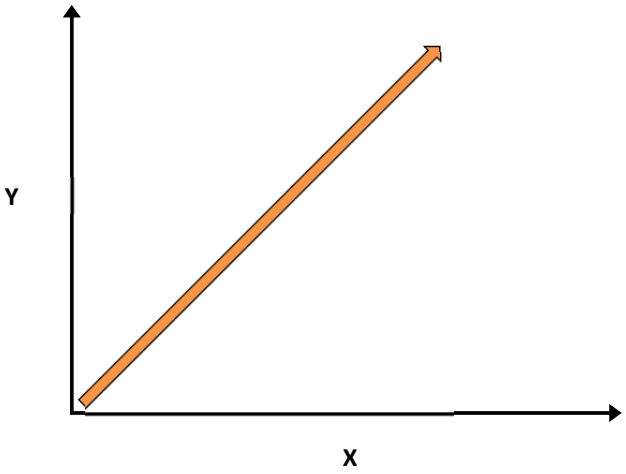
1. The manager of the plants had poor knowledge on how the different plants owned by business unit A were performing, and thus the performance measurement system was needed to provide the visibility.
2. The business unit senior vice president wanted to have information on the plants.
3. The business unit wanted to offer the plants a leadership tool to develop their own performance. They also wanted to create a chance for the plants for benchmark each other, and initiate discussion where a plant that underperformed on certain area would receive help from other plants on how to correct the issue. This was meant to be a process that plant managers would autonomously run.

Led by C-A, a balanced scorecard for the business unit was developed. This scorecard included four views: customer, processes, personnel and owners (financial). The initial scorecard is illustrated in table 5.2.

Table 5.2. Initial Balanced Scorecard for BU A.

Customer Measure 1 Measure 2	**Processes** Measure 1 Measure 2
Personnel Measure 1 Measure 2	**Owners** Measure 1 Measure 2

After a while, however, upper management commented that what they needed was a simple presentation with information as graphs, with the same information in a table below. This led to dropping the balanced scorecard, and to the development of a simple PowerPoint package, with selected key performance indicators, formatted as in figure 5.5. This package originally included 16 measures, but recently the number was dropped to 8.



X	1	2	3	4
Y	1	2	3	4

Figure 5.5. Format for performance measurement information.

C-A has defined that there are four critical success factors that any manufacturing company has to monitor and control:

- Quality
- Efficiency and productivity
- Fixed costs
- Reliability

In addition to these, it was mentioned that in the case organization the lost time injury frequency is a must indicator that has to be included in any performance measurement system.

Procedures to make this report happen are as follows. C-A and the managers of the plants send out spreadsheet templates to which the measurement data should be input. Each plant then reports their monthly numbers. The controller then compiles the data and prepares the analysis in the form of a PowerPoint presentation. The report created is usually distributed to the manager of the plants, product line vice presidents, business unit president, and if requested, to the business line president. There is no formal review process in place.

The objectives set for the performance measurement system have been only partially fulfilled. Visibility to the plants has increased for both the manager of the plants, as well as the business unit SVP. However, the objective of creating an interactive leadership and benchmarking tool for the plants has not been reached. “The plants do not feel like they own the system, and do not use the system on the plant level”, as C-A states. “They do report the data that is required of them, but do not use it internally.”

Most of the development effort has been made to get the numbers for the measures. The usage has gained less attention. Problems have risen from too loose definitions of measures, which have led to different plants reporting different things. According to C-A the biggest problem with the measures currently in use in BU A is that they are lagging indicators: “The biggest problem currently is that the measures are very backwards looking. If you take a look at the measures here, you can see that most of them are history oriented.” This makes the organization’s reaction speed to the signals of the system poor. The limitations set by non-harmonized information system usage and its set-up also create challenges for measuring performance. A lot of time is spent on data validation.

As a vision for the future C-A thinks that all information should be possible to be extracted straight from the ERP. The definitions should be harmonized, and the system should include more future-oriented measures that would be able to give early signals, on which decisions would be made in common forums. He also considers there is a need for a comprehensive performance measurement system tool that would be easy-to-use and integrated to the ERP.

Regarding to incentives, C-A thinks that they should be integrated to the PMS, with weights that matter to the person. Currently, the situation is that only small part of an individual's incentives is caused by his own actions, whereas a larger part comes from the company's performance as a whole. C-A felt a need for more control over his incentives, but also recognizes that the case organization's ability to pay rewards has to be taken into account.

5.2.2. Performance measurement in business unit B

For business unit B, the controller (from here on referred to as C-B) leading the performance measurement system development was interviewed. The controller had joined the company in the beginning of year 2012, and has since worked on implementing a performance measurement system for the plants of BU B.

Before C-B joined the company, the situation in BU B was similar to the one in BU A. There was no integrated measurement system, and the level of measurement systems varied greatly between the plants: "There were differences in factories. Some quite developed with good local measurement systems, some never measured anything. Some never made budgets. Some were really underdeveloped, so there were also tremendous opportunities for improvement. It is a long journey for them." Even though some plants did have their measurement systems, the results were never reported outside of the factory.

The need for a performance measurement system was apparent for C-B, since he had implemented several of them in the companies he previously worked for. The most important objectives were to

- Increase visibility
- Increase the understanding of cause and effect
- Reduce costs: having increased transparency over the production process, and a system of following it up, the plants could be put pressure to reduce cost

The first step C-B took in developing the measurement system was to develop a record of key performance indicators. This record is currently reported to C-B and the supply chain manager of BU B, and covers the most important aspects of the business. These measures included in the report have been chosen by C-B, and are based on personal experience.

As with BU A, in BU B the plants report the inputs for the measures through templates distributed by C-B and the supply chain manager of BU B. The analysis and preparation of a PowerPoint report is currently done by C-B. There has also been a review process implemented, in which the aim is to go through the results of the performance measurement with the representatives of the plant in question. Resources pose a

problem in this process: “Initially we wanted to have the meetings with the plants every month, but in reality we have managed to have them once every two months.”

In addition to this KPI report, C-B also has implemented a budgeting process for the plants. In it, the plants are required to fill in volume assumptions, resources needed, basic strengths-weaknesses-opportunities-threats (SWOT) analysis and activities the plant plans to improve its performance with. These activities often aim for cost reduction and efficiency increases. The activities originate from the plant, but C-B emphasizes that they have to be followed up together with the product line representatives in order to make sure that they get implemented.

C-B also comments that he wants to keep the responsibility in the measurement process in the plants, even though some of the measurement data could easily be gotten from the ERP. Even though there has been some tries to trick the system, it is considered sufficient as the important thing is that focusing on the area makes the plants focus on it too, and try their all to improve on it, even if it includes some tricking.

As in BU A, also in BU B one of the objectives in the performance measurement system development is to enable plants to benchmark each other, and to get a sense of where they stand in comparison to other plants. However, some plants in BU B differ significantly from each other, which makes comparison difficult. An impediment for benchmarking is also the plant personnel’s fear of increased visibility revealing unfavorable numbers to a plant, leading to negative consequences.

As a vision for the future, C-B echoes the view of C-A of data being extracted straight from ERP, but in the meanwhile it has to be manually input: “Of course it would be ideal to get all the data from ERP, but it’s not reality yet. Meanwhile, we got to start with something.” Ideally all the analysis and reporting work would be done as part of the general reporting of the organization. Regarding to incentives C-B agrees with C-A in that currently too small a part of one’s rewards come from factors that he can affect individually, and that the incentives should be linked to the performance measurement system. He adds that there should be more co-operation between the business units, and the same tool for performance measurement should be used.

5.3. Case company analysis from PMS perspective

5.3.1. Key findings from the interviews

The most important findings from the interviews described in chapter 5.2 have been collected into Table 5.3.

Table 5.3. Key findings from the interviews.

	Finding
1	Increased visibility is an important objective of the performance measurement system for the case organization
2	Currently, the information systems have much potential but the realization of it is problematic due to diverse processes and data structures
3	There is still significant room for improvement in the performance measurement systems
4	Performance measures have not been devised from higher level strategic objectives, but based on personal experience
5	Plants are adopting the centralized performance measurement system variably
6	Unclear definitions of measures have caused problems
7	Plants may be hard to compare to each other due to different processes

The theme of increased visibility repeated throughout the interviews, and also was one of the starting points for this thesis as an objective communicated by the performance measurement system project leader. The organization has a global, single ERP, which cannot yet be utilized for the purposes of performance measurement systems, but may hold potential for future development. The practices of performance measurements are varying across the plants, and there is significant potential for improvement of unified performance measurement processes. The current sets of measures in use are largely result of experience of the managers and partly result of what has been possible to obtain. The implementation of centralized performance measurement systems has not been achieved to full extent, since problems with its usage in the plant level seems to be variable. In BU A the plants did not seem to be using it internally, but rather just sending the data. BU B seemed to have better experience with this, perhaps because of tighter follow-up processes. Definitions were often stated to pose a problem, and they are being constantly made more accurate. A problem for comparing plants and unifying the measurement systems is also that the processes of different plants may differ from each other significantly.

Next, the results of analysis from internal documents will be reviewed. The performance measurement systems will be analyzed, and the processes learned of by interviews are presented.

5.3.2. Current performance measurement systems

Performance measures for the plants in Business unit A and B were collected into a list and analyzed. The measures were categorized by:

- BSC Category: The balanced scorecard category is used to analyze how balanced the set of metrics currently in use is.
- Target of measurement: Simons' (2000) categorization is used to analyze which phase of process is measured.
- Financial/non-financial: The balance between financial and non-financial measures is analyzed.

The business units had performance measurements that were slight variations of each other, such as production per available capacity and production per theoretical maximum capacity. These were combined into one measure for simplicity.

Business unit A's measures are listed in table 5.4. As can be seen, the system seems to lean on internal process view heavily. 19 out of 25 measures are focused on the business unit's internal processes. The division between financial and non-financial measures is heavily leaning towards non-financial, with 21 out of 25 measures non-financial ones. Moreover, nine out of 25 measures are measuring inputs, meaning that these will be more of an informative kind than an indicator of performance. This was also confirmed by C-A.

Table 5.4. Business unit A's performance measures.

Measure	BSC Category	Target of measurement	Financial/non-financial
On-time deliveries %	Customer	Outcome	Non-financial
Energy savings kEUR	Financial	Outcome	Financial
Inventory value kEUR	Financial	Outcome	Financial
Under absorption kEUR	Financial	Outcome	Financial
Backlog (tons)	Innovation and future	Input	Non-financial
Backlog duration (months)	Innovation and future	Input	Non-financial
Allocated headcount	Internal processes	Input	Non-financial
Capacity (hours)	Internal processes	Input	Non-financial
Capacity usage %	Internal processes	Outcome	Non-financial
Contracted headcount	Internal processes	Input	Non-financial
Equipment utilization %	Internal processes	Outcome	Non-financial
External quality cost %	Internal processes	Outcome	Non-financial
Gap to capacity (tons)	Internal processes	Outcome	Non-financial
Internal quality cost %	Internal processes	Outcome	Non-financial
Lost time incident frequency	Internal processes	Outcome	Non-financial
Maximum capacity (tons)	Internal processes	Input	Non-financial
Permanent headcount	Internal processes	Input	Non-financial

Production amount (tons)	Internal processes	Outcome	Non-financial
Quality cost / COGS	Internal processes	Outcome	Non-financial
Quantity of deliveries	Internal processes	Outcome	Non-financial
Temporary headcount	Internal processes	Input	Non-financial
Tons produced / headcount / year	Internal processes	Outcome	Non-financial
Total cost (EUR/kg)	Internal processes	Outcome	Financial
Total headcount	Internal processes	Input	Non-financial
Total production per blue collar	Internal processes	Outcome	Non-financial

Business unit B's performance measures are listed in table 5.5. The balance in the system is not as heavily biased into to internal processes of the plants but take into account other stakeholders as well. The owner perspective, financials, is represented with 5 measures out of the total of 27. With BU B, as with BU B, the input measures are a significant share of all, 10 out of 27. The split between financial and non-financial measures is 10 financial, 17 non-financial. Noteworthy in BU B's set of metrics is the amount of measures indicating future environment and performance, 4 out of 27.

Table 5.5. Business unit B's performance measures.

Measure	BSC Category	Target of measurement	Financial/non-financial
External Claims (No#)	Customer	Outcome	Non-financial
Availability %	Customer	Outcome	Non-financial
On-time deliveries %	Customer	Outcome	Non-financial
Hourly rate	Financial	Input	Financial
Average salary increase	Financial	Outcome	Financial
Product cost development	Financial	Outcome	Financial
Inventory value EUR	Financial	Outcome	Financial
Backlog duration (months)	Innovation and future	Input	Non-financial
Backlog (EUR)	Innovation and future	Input	Financial
Orders received (EUR)	Financial	Outcome	Financial
Planned activities	Innovation and future	Input	Non-financial
Planned training days for employees	Innovation and future	Input	Non-financial
Lost time incident frequency	Internal processes	Outcome	Non-financial
Planned activities finished	Internal processes	Outcome	Non-financial
Total headcount	Internal processes	Input	Non-financial
Permanent headcount	Internal processes	Input	Non-financial
Temporary headcount	Internal processes	Input	Non-financial
Contracted headcount	Internal processes	Input	Non-financial
Allocated headcount	Internal processes	Input	Non-financial
Internal Waste (kEUR)	Internal processes	Outcome	Financial
Internal Scrap (kEUR)	Internal processes	Outcome	Financial
Rework (kEUR)	Internal processes	Outcome	Financial

External Claims (kEUR)	Internal processes	Outcome	Financial
Supplier delivery accuracy %	Internal processes	Outcome	Non-financial
Inventory turns	Internal processes	Outcome	Non-financial
Use of manpower (hours)	Internal processes	Outcome	Non-financial
Equipment utilization %	Internal processes	Outcome	Non-financial

In addition to these the global function of distribution is also frequently reviewed in the organization. The measures used are listed in table 5.6. The system used for distribution may be the most balanced of these systems, as all perspectives are represented: customer (5/12), innovation and future (1/12), internal processes (3/12) and financials (3/12). Moreover, all the measures are measuring outcomes of processes, and the split between financial and non-financial measures is three financial to nine non-financial.

Table 5.6. Distribution function's performance measures.

Measure	BSC Category	Target of measurement	Financial/non-financial
On-shelf availability	Customer	Outcome	Non-financial
On-time delivery	Customer	Outcome	Non-financial
Outbound availability	Customer	Outcome	Non-financial
Reliability	Customer	Outcome	Non-financial
Inventory healthiness	Innovation and future	Outcome	Non-financial
Outbound sales order lines amount	Internal processes	Outcome	Non-financial
Cost per order line shipped EUR	Financial	Outcome	Financial
Outbound freight expenses EUR	Financial	Outcome	Financial
Inventory value EUR	Financial	Outcome	Financial
Supplier reliability	Internal processes	Outcome	Non-financial
Inventory turns	Internal processes	Outcome	Non-financial
Response time to purchase orders	Customer	Outcome	Non-financial

In summary, the performance measurement systems for plants seem to be leaning on average heavily towards internal process measures, which is understandable taking into account their function. The plants seem to be using both financial and non-financial measures in balance. The amount of input measures is relatively high, considering that the academic literature does not recommend using them if measuring process or outcome is possible, unless radical innovations are required.

The performance measurement system for distribution function seems to be mostly in accordance with the academic literature, which recommends the usage of balanced set of metrics that measure outcomes of processes, with both non-financial and financial measures represented.

5.3.3. Processes

The current performance measurement processes were studied for business units A and B. The basic principle for both was the same. Excel spreadsheets were prepared by either the controller, or a supply chain manager of the business units, into which the plants then locally input their data.

This data was then collected from all the plants, and PowerPoint presentations were prepared. The difference between BU A and BU B seems to be in that in BU A, the results of the data analysis were treated as a report that was then sent to the relevant people. Figure 5.6 illustrates the process.

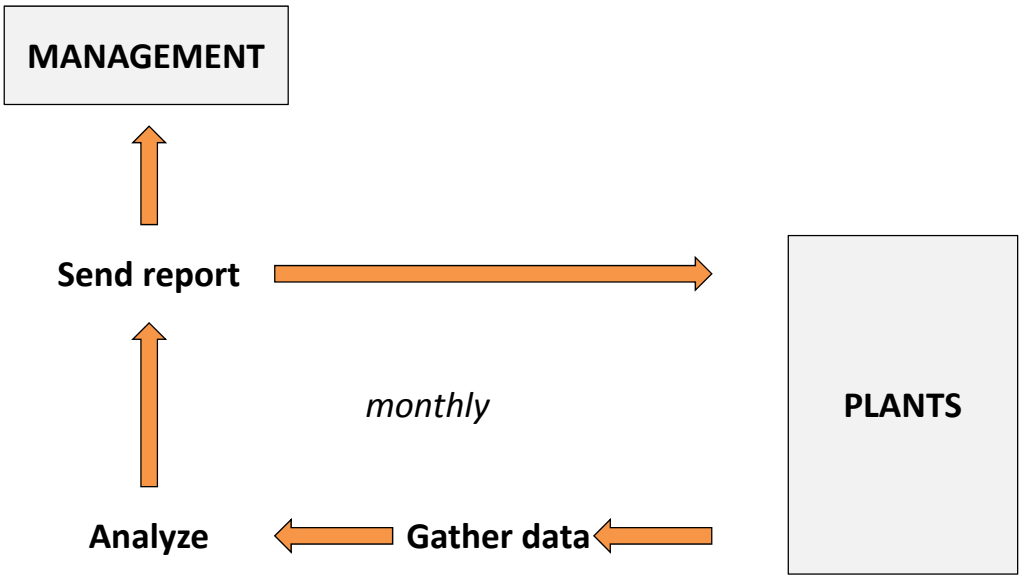


Figure 5.6. Performance measurement system usage in BU A.

In BU B, the presentations were treated more of as an agenda for discussion and follow up. C-B and the supply chain manager for BU B pursued to have a discussion with the plant manager and other relevant local personnel at least once every two months, where they would together discuss the measures, activities planned to improve them, and follow up on past activities. The process is presented in figure 5.7Figure 5.7.

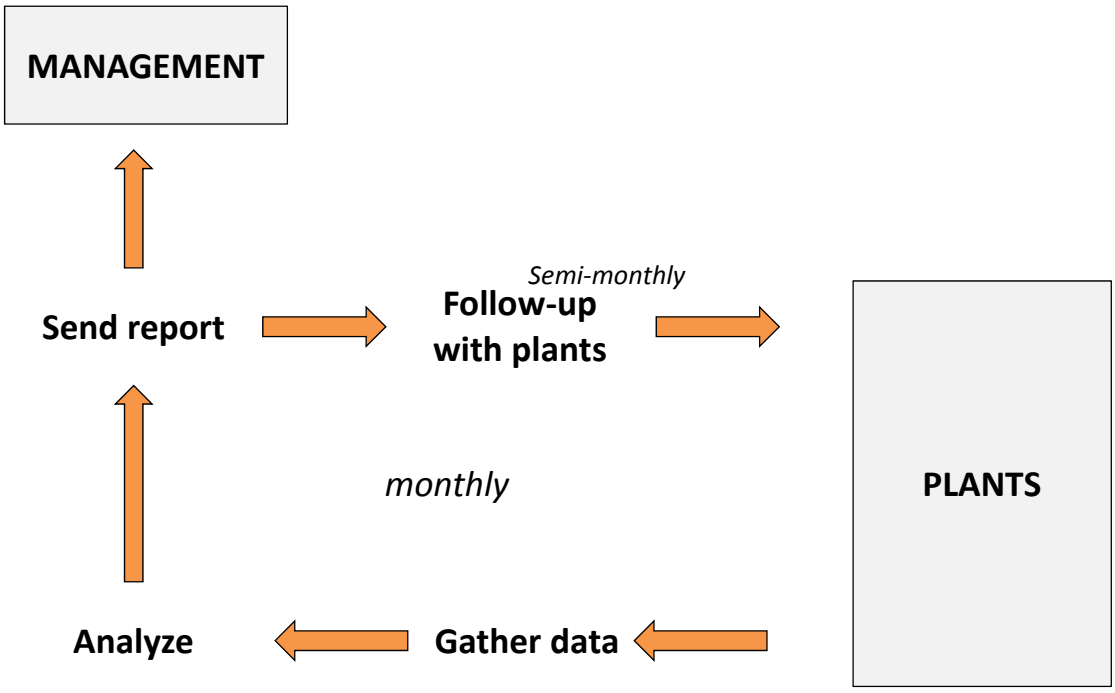


Figure 5.7. Performance measurement system usage process in BU B.

Based on the interviews, BU B has had more response from the plants to the performance measurement. As BU A said, the plants do not feel that they own the system, and have continued using their own systems instead, but do provide the data when asked. In BU B, the experience was that the plants are starting to use the systems provided, and progress is made. The key to the process might be the participative follow-up process on the indicators with the plants. C-B emphasizes this point: "There must a plan, and always follow-up and pressure."

5.3.4. Organization culture

As was discussed in chapter 4.2.1, corporate culture has an effect on what kind of performance measurement systems should be used in the organization. According to the global supply chain vice president of the case organization, the performance measurement system to be implemented would also need to be a vehicle of culture change towards a more performance oriented culture: "The president wants to implement performance culture to our organization. He sees the performance measurement system as one way of moving towards it". Performance culture here refers to culture where good performance is rewarded, and the reasons for underperforming are figured out and corrected. In this section the culture of the case organization will be analyzed regarding to performance measurement system usage. After determining the general category of the organization culture, the case organization will be analyzed on whether a formal performance measurement would fit it on the basis of its environment. Goold and Quinn's (1990) framework will be utilized for this purpose. Finally, as we

will see that the firm may indeed benefit from a performance measurement system, we will take a closer analysis of the kind of performance measurement that should be used. In this, a framework proposed by Ouchi (1979) will be used.

Eker & Eker (2009) divided organization cultures into control and flexibility cultures. As discussed in chapter 4.2.1, control cultures are characterized by stable environments, where focus is on forecasting, efficiency, and structured ways of working. Flexible culture is typical of a dynamic firm in a turbulent environment, where change is continuous and customer requirement change often.

Based on the interviews conducted, the case organization would fall into the category of control culture organization. The case organization's industry is a relatively stable one, and the case organization is a major firm in the industry. The attempts to forecast and reduce costs have been apparent based on the discussions had. Eker and Eker (2009) suggest that control culture organizations use performance measurement systems mainly for planning purposes, to determine deviations from plans, and to define productivity.

However, based on the interviews had, the organization aims to change this way of using performance measurement systems. "The performance measurement system needs to become a management tool" as the global supply chain vice president stated. What the organization is aiming is in many ways suggesting that the organization culture needs to become more flexible. Flexible culture's performance measurement system is described by Eker and Eker (2009) as observing the changes around the firm, checking whether internal performance targets are met, sustaining the continuous improvement, etc. This suggests a more interactive usage of performance measurement systems, and that is also explicitly said by the interviewees.

Next the value of a performance measurement system will be evaluated. Goold and Quinn (1990) divided organizations into four categories by the environmental turbulence they face, and the ability to specify and measure precise strategic objectives. Environmental turbulence here refers to changing customer requirements, tight regulation and competition among others. Ability to specify and measure precise strategic objectives means how easily can targets which fill the criteria presented in chapter 3.2.1 be set. The possible alternatives are illustrated in Table 5.7.

Table 5.7. Value of performance measurement systems. (Goold and Quinn 1990)

		Ability to specify and measure precise strategic objectives: Easy	Ability to specify and measure precise strategic objectives: Difficult
Environmental turbulence	High	Strategic control system valuable, but should not be tightly administered	Strategic control system problematic
	Low	Strategic control system valuable	Strategic controls more for tracking progress than motivation

Environmental turbulence for the case organization would be relatively low for the case organization. Even though the organization's industry is getting the attention of law makers, the industry itself is a relatively traditional machinery industry, where the case organization has a stable position. However, the case company would lean towards the high-cell, but still be in the low-one. The ability to set targets is as discussed in chapter 3.2.1 seldom perfect, but in the case organization is still is relatively easy. Based on this analysis, a performance measurement system would be valuable for the organization, and might need to be administered a bit tighter than average.

Ouchi (1979) divides different forms of control applicable to a firm by its working environment. The two factors used are the ability to measure outputs precisely and objectively, and the knowledge of means-ends relationships (Table 5.8). The first one relates to how well one can measure the outputs of the processes: this might be challenging to do for a research and development department, but easy in the case of a factory producing simple items. Knowledge of the means-ends of cause-effect decisions might be easier in a mechanistic environment, than in an environment with complex social relationships. For example, knowledge of means-ends relationships is supposedly higher in the case of an industrial process than presidential election, where it would be difficult to foresee which actions will get the most votes.

Table 5.8. Types of control (Ouchi 1979).

		Knowledge of means-ends relationships (ie. ability to predict what will be the outcome of given decisions/policies/strategies)	
		High	Low
Ability to measure outputs precisely and objectively	High	"Action" or "Results" control	"Results" control
	Low	"Action" control	"Clan" control

The case organizations ability to measure outputs would, based on this categorization, be relatively high. The industry in which the case organization acts is a typical industrial environment, where the outputs are concrete products. Knowledge of means-ends relationship is also relatively high, since much of the activity in the organization is related to concrete processes and items. This analysis would suggest that for the company, either "Action" or "Results" control would be appropriate.

In summary, this analysis of organizational culture has yielded the results with which the performance measurement system will next be defined.

- Strategic control system valuable
- Gradual move towards a more flexible culture
- Action or results control used

Currently the organization culture and the control systems used are defined by the organization's control culture. The organization, however, wants to make a move towards a more interactive use of control, which would suggest that the organization culture is shifting towards a flexible culture. As the literature suggests, a flexible organizational culture is linked to interactive usage of performance measurement systems. In a flexible culture, the use of performance measurement systems was described to be active, checking for both internal and external changes in environment and performance, as well as taking into account the future uncertainties. This kind of usage can be linked to the concept of enabling control, where performance measurement systems are used as tools which enable managers to better do their work, instead of the system coercing them. The requirement from the organization was to enable the use of the performance measurement system as a management tool, and thus it would seem that the organization is willing to make a move from coercive control towards a more

enabling form of performance measurement system usage. Thus, the system and usage process to be developed should contain the principles of enabling control. The organization should gain value from a strategic control system, since the environmental turbulence is relatively low and the ability to set targets is good. The firm can choose from action or results control, since the knowledge of means-ends relationships is high, as well as the ability to measure its outputs.

6. THE NEW PERFORMANCE MEASUREMENT SYSTEM

6.1. Requirements

6.1.1. Case organization

Requirements from the case organization side were based on the interview with the global supply chain vice president, who is also the manager of the performance measurement system development project. Part of the requirements originated from case organization president.

Through the interviews it became apparent that visibility is a key concern. C-A, C-B and the global supply chain VP all stated that visibility has been a problem, and performance measurement is seen as one way to solve it. Traditionally there has been little centralized coordination in the case organization, and the local units have had relatively large freedom over their performance management. This has also caused problems when senior managers are not familiar with the operations of the plants they own. Plant performance could not be evaluated in the absence of unified measures.

Traditionally the use of performance measurement systems has been passive in the organization. The supply chain vice president stated that the performance measurement system needs to become a management tool, not just a report.

The system is meant to unify the organization. This means that unlike currently, when there are multiple different systems with different terminologies and structures, there should be a common system, with unified common terminology and structure. This is to facilitate the discussion and usage of the system

The president of the case organization also believes that there is a need to link every action to how they contribute to the financial end results. This is to increase focus into the financial results, and also to align the organization in achieving them.

Finally, the longer term objective for the organization is a transformation of the culture from passive to a more active and performance centered one. The vision of the president of the case organization is that in the future, high performance would be rewarded, and underperforming would be addressed.

6.1.2. Literature

The literature review performed resulted in a set of requirements for designing performance measurement system structure. There were three requirements. First, that the measures should be balanced and take into account processes, financials, innovation, customers, and other stakeholders. The first requirement can be understood from a design perspective so as that the system should enable the multiple perspectives and balancing of measures. Second, the structure should order the measures in a way in which strategic top level measures and lower level operative measures are aligned (deployment). The measures should have explicit logical links. Third, the measures should be possible to assign a responsible organizational level and a function (integrity).

In addition to requirements from the design perspective, the utilization of performance measurement also sets a group of requirement that the system should be able to fill. In order for the managers and employees to view the system as enabling of their work, the system should enable repair and flexibility. This means that the single measures should possible to modify and adjust, if problems with them are noticed. In other words, the structure must not be too rigid. The system also should enable internal and global transparency. Internal transparency requires that the structure consists of easy-to-understand parts and does not aggregate measures in an overwhelming way. Global transparency requires that the individual measures in the system are linked in a logical way that illustrates the linkages between one measure and the others.

Summary of the most critical requirements for the performance measurement system structure are collected into table 6.1.

Table 6.1. Requirements for performance measurement system.

	Requirement	**Source**
1	Increases visibility throughout the organization	Case organization
2	Integrate performance measurement systems across departments and managers	Case organization
3	Be an interactive management tool	Case organization
4	Facilitate culture change towards a more performance centered one	Case organization
5	Must link all measures to financial results	Case organization

6	Facilitate balanced metrics that take into account the different perspectives of business	Literature
7	Should enable the use of both financial and non-financial measures	Literature
8	Deployment: Lower level objectives derived from organization strategy and deployed throughout the organization	Literature
9	Integrity: The structure should be able to distinguish between organizational divisions and functions	Literature
10	Facilitate enabling control: enable repair, flexibility, and internal and global transparency.	Literature/case company analysis

The list contains ten requirements for the performance measurement system to be designed, of which five were set by the case organization and five which were found to be the most important in the literature. In the next chapter, a performance measurement design process will be described which takes these requirements as the starting point of the process.

6.2. Performance measurement system structure design

One of the requirements is to facilitate unifying the organization. However, many of the existing performance measurement systems have difficulties tying the measurement systems for different departments or people together.

Take for example balanced scorecard. The basic process of developing a BSC is starting from the organization's strategy, translating it to objectives, and developing measures for these objectives. However, the literature on BSC development says little on how to link together person A's and person B's BSCs.

Another reason a BSC might not be suitable for the purposes of the case organization is the explicit need for visibility in the organization. A performance measurement system to be implemented should increase the transparency of the organization, and from a set of balanced scorecards it would be difficult to achieve.

Through meetings with the leader of the project a hierarchical tree-model was decided to be used as a frame for the performance measurement system. It resembles to Du Pont –chat, where return on investment is placed on top, and then with branches it is divided into its factors. The same logic applies here.

The benefit of using a hierarchical model is its ability to fulfill the requirement of linking performance measures to financial results. By explicit linkages from one measure to another all the way to financial results, the hierarchical model forces the management to create an illustration of the factors for financial success. It also makes possible to define the required factors of visibility into the model as separate branches. The hierarchical model also enables linking the measures both vertically and horizontally in a way where vertical linkages represent deployment from higher level objectives to lower level ones and horizontal linkages represents different functional areas.

The requirements set in literature are also facilitated by a tree-like hierarchical model. When the steps down the hierarchy are kept small, the measures also stay understandable and simple. Simple measures improve internal transparency. When the measures are explicitly linked to each other, the connections between them are easier to recognize, which improves global transparency. It also facilitates repair and flexibility, since the measurement system as a whole is easier to maintain.

6.3. Results and determinants

The structure is based on the idea of results and determinants. A determinant or a group of determinants leads to results (figure 6.1). The linkage here primarily reflects a mathematical formula, but in all cases it is not possible to define such formula. For example, it is easy to see that the total costs of goods sold are the sum of direct costs, indirect costs and the cost variance. However, for the number of quotes won such formula is more difficult to create, and in that case the management should apply their knowledge of what enables the organization to win quotes. One example could be that the determinant for result "quotes won" would be the value offered to the customer, and the selling effort made.

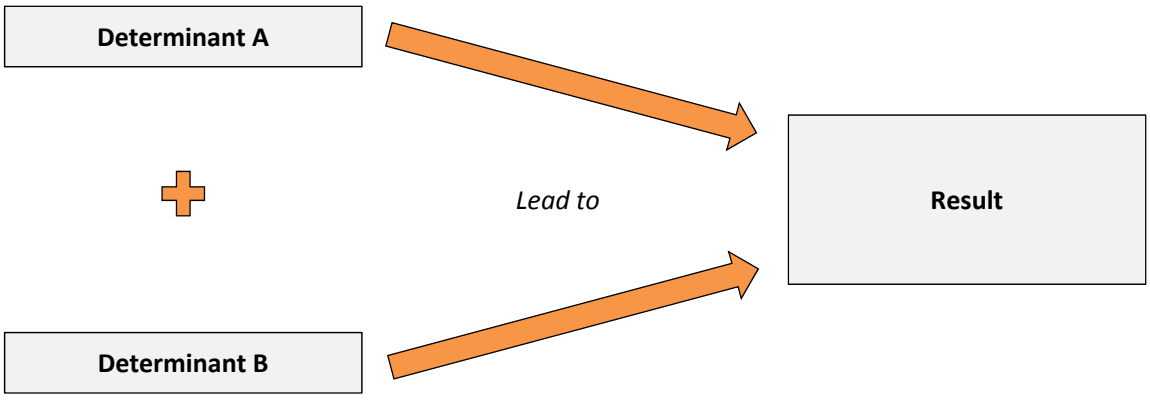


Figure 6.1. Results and determinants.

The idea in defining results and determinants is that the management will start from the most important result for them. For this result, the determinants will be defined next.

After this, the previously defined determinants are now results and determinants for them should be defined. This is a top-down approach, which encourages the management to focus on the most important objectives, and derive the measures from there.

Development of the system for the case organization could go as follows. For the case organization, the president has defined that the most important measure is return on capital employed (ROCE). This means that the first result is ROCE, and the determinants for ROCE follow from its mathematical formula: return (operating profit) divided by capital employed. Next, the result of operating profit follows from the mathematical formula of net sales – cost of goods sold – sales and general administration costs. This process can be continued to form a hierarchy illustrated in figure 6.2. This forms the basis for the system. In the system, the lines connecting determinants to results represent sums. The brackets around determinants represent that the determinant is a negative number, such as costs. Only in two cases the lines do not represent a sum of determinants: the top level measure of ROCE which is a division and meant to connect the two hierarchies, and on the lower levels of determinants, where a mathematical linkage cannot be made.

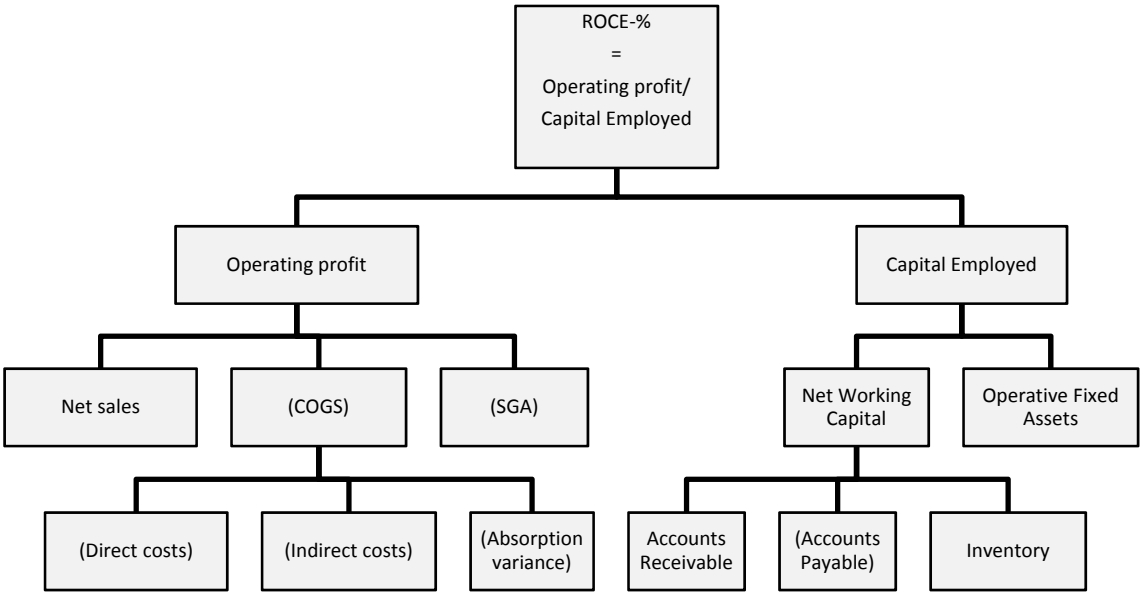


Figure 6.2. Top of the performance hierarchy.

At the moment, the system only includes financial output measures. To fulfill the requirements, the system needs to be able to incorporate other kinds of measures as well. Example of this would be the inventory value. It might not be an adequate measure itself, since inventory value might have gone up from bad inventory management or demand for the organization's products growing within the time period the measures are reported. This is why a performance indicator of inventory turnover

(cost of goods sold / average inventory value) could be added into the inventory branch (figure 6.3). In a similar manner, other non-financial measures may be added to better reflect the operative performance.

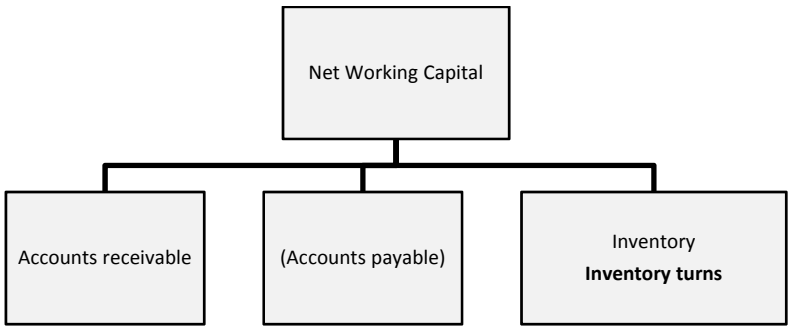


Figure 6.3. Inventory turns in the hierarchy.

The hierarchical structure ensures deployment because of its logical links from higher to lower levels in the organization. Also the measures tend to stay simple and easy-to-use when each result is divided into its determinants and the linkages are explicit. For the additional measures such as inventory turnover, a factor making them easier to understand is that they are directly linked to what they are believed to be an indicator of, in this case inventory.

Balancing measures should be easier when all the metrics are in the end part of the same hierarchical model. This makes it possible to evaluate whether the hierarchy itself is in balance, and an accurate representation of the management beliefs of financial performance, and the determinants that lead to it.

6.4. Users

This kind of two-dimensional model, however, is still not enough. A single person cannot be responsible for the whole system's measures. Requirements in chapter 6.1.2 also state that the structure must be able to assign responsibility to an organizational function. Without this feature, a structure could not distinguish the impact of for example logistics and production in measuring lead time. Also the different divisions working on the same organizational level should be able to be separated. For example, the direct costs for the organization are the sum of direct costs from all business units. To improve integrity, a new dimension is needed.

As an example for this, the branch of net sales will be used. Figure 6.4 presents an example of what a finished hierarchy for net sales might look like. Here, the logical process of constructing the measures is the following. Net sales are the result, for which orders received is the determinant, since all invoiced sales follow from orders received. For orders received, the determinant is quotes won, since all orders result from a quote. However, for quotes won there is no single, absolute determinant as in the previous

cases. Thus, here management is required to establish their vision of what factors con-contribute to winning quotes. It should be noted that the examples used in this thesis are only for the purpose of demonstrating the usage of the performance measurement system structure.

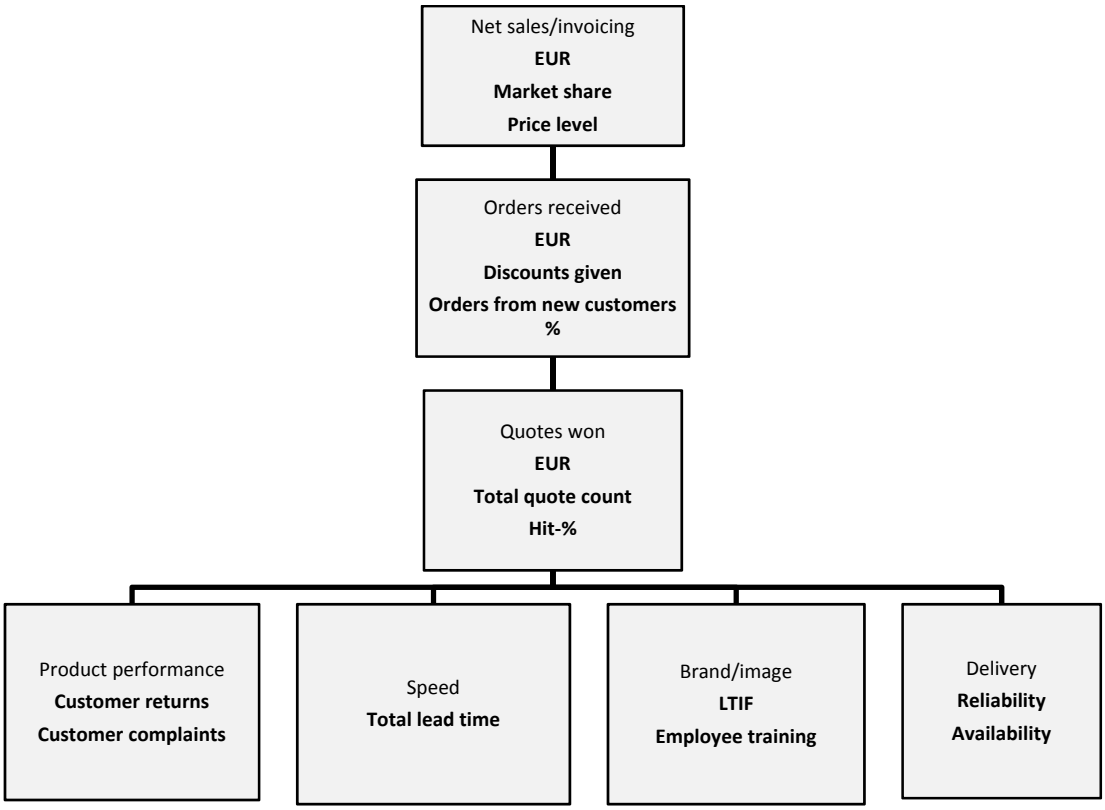


Figure 6.4. Net sales hierarchy.

As can be seen from the illustration, here the money-based indicators are being backed up by an array of different non-financial indicators for the money-based indicator. The framework enables including different perspectives of performance measurement. For example, here customer view is taken into account by measuring product performance through customer returns and complaints and lead times. Internal processes are being measured partly by lead times, LTIF, and delivery indicators. Financial perspective is taken into account by measuring net sales and orders received, but also the amount of discounts given to customers and the price level sold with. Learning and innovation is measured with employee training.

To split the hierarchy up for different function and users it needs a third dimension. For one user, the hierarchy presents some relevant indicators, and some irrelevant. In tailoring the tree for the user the point is to remove the measures not relevant, and leave the relevant ones, still preserving the structure of the hierarchy. Figure 6.5 illustrates a hierarchy for a supply chain manager in this case.

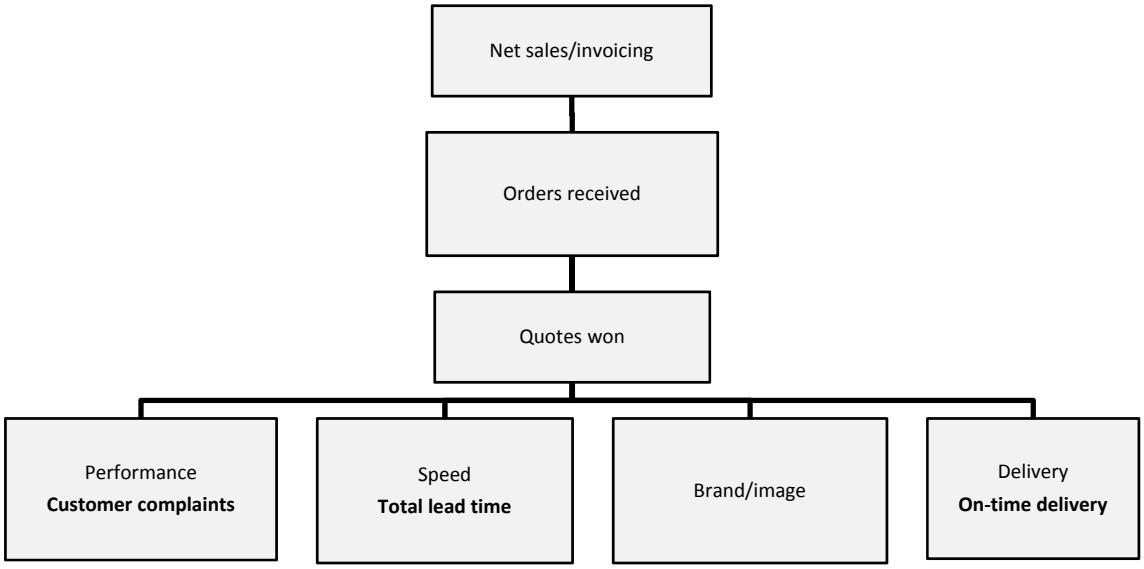


Figure 6.5. Supply chain manager's performance measurement hierarchy.

As figure 6.5 illustrates, the hierarchy has now significantly fewer measures. The structure is still maintained in order to facilitate internal and global transparency, and for easier maintenance of the performance measurement system as a whole. In this example, the supply chain manager is assigned three indicators: customer complaints, total lead time and on-time delivery. These measures would indicate that the three most important things that are expected from a supply chain manager to contribute to net sales are that the organization can reliably estimate its delivery times, can deliver the products quickly, and in this way improve customer satisfaction.

The net sales hierarchy for a plant manager looks different (figure 6.6). It contains five measures: customer returns and complaints, manufacturing lead time, LTIF and manufacturing reliability. It is a representation of what the upper management expects from the plant managers to contribute to net sales: high customer satisfaction through reliable and fast manufacturing processes, and also safe working environment for the employees.

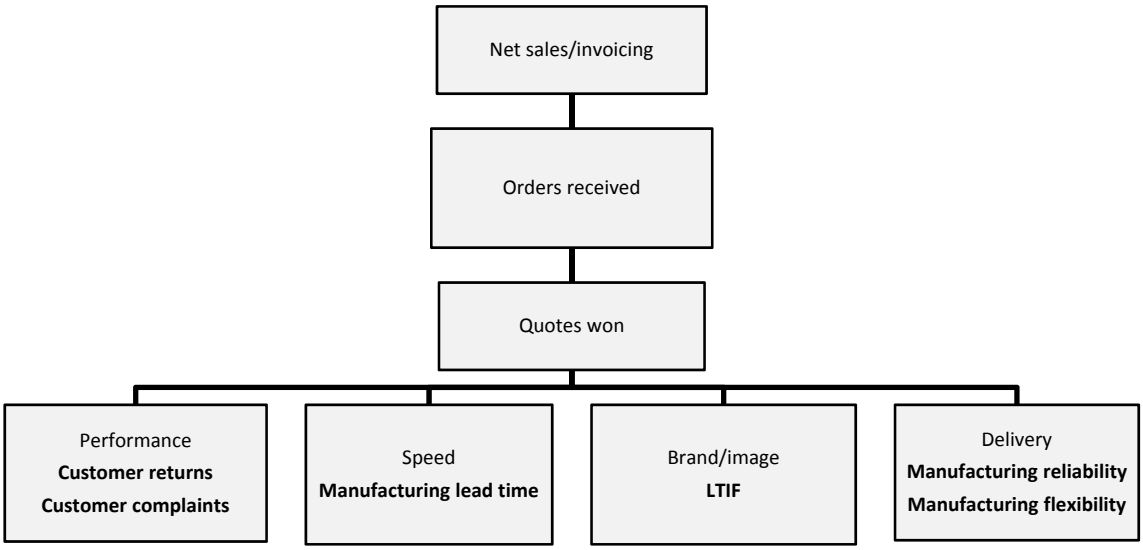


Figure 6.6. Plant manager's performance measurement hierarchy.

This way the hierarchy is starting to build up a third dimension, consisting of the measure hierarchies of the users. This is illustrated in figure 6.7. The measures of the users make up the total measures of the organization. By building the hierarchy, the organization builds a description of the factors and contributors it believes are needed to achieve the net sales level it is aiming for.

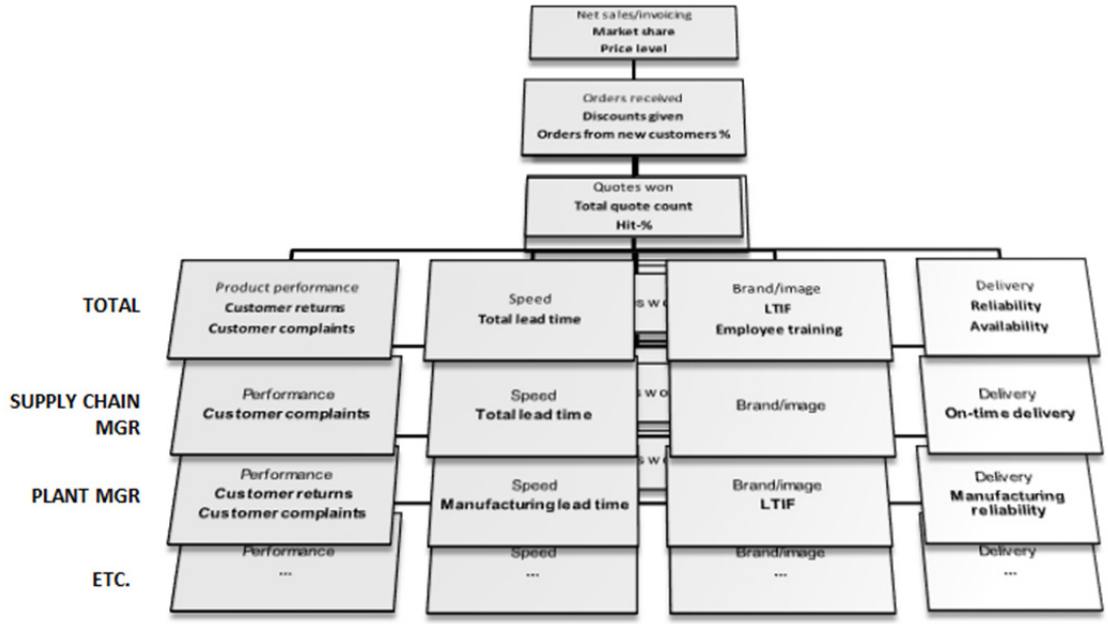


Figure 6.7. Users in performance measurement hierarchy.

The total tree represents the collection of all measures the management determines are relevant in assessing the organization's performance. Of these measures, single users of the system, such as supply chain manager or plant manager as in the example, should then be assigned the most relevant measures for that person. Here, supply chain manager was assigned the responsibility for customer complaints, total lead time and on-time delivery as the three most important ways in which he or she can affect the net sales of the organization.

6.5. Example of usage: measuring plant performance

This section describes a performance measure hierarchy design process for plants. The objective of such a hierarchy would be that it enables plant management to use it as a tool for management, and enables the manufacturing vice presidents to evaluate and manage the plants itself. The design process should start from the top, from the measure the president of the organization has judged most important, return on capital employed. The basic structure again, is the same for all divisions and functions, to remain consistent.

In the previous section a sample tree of net sales was built for plant management. The other branches which have not yet been defined for plant management are: cost of goods sold (COGS), sales and general administration costs, net working capital and operative fixed assets. Of these, plants do not incur sales and general administration costs, so those branches will be left blank. However, to the other categories plants do contribute. Next, a look at each branch will be taken.

Cost of goods sold can be divided into direct costs, which are the costs calculated with standard costs of labor and material with estimated production volumes, indirect costs, which are the costs not directly related to processing the products and then the cost variance, which constitutes of variances from the estimated costs. All of these costs are the responsibility of plants. Thus, the financial tree of COGS measures would look like the one illustrated in figure 6.8.

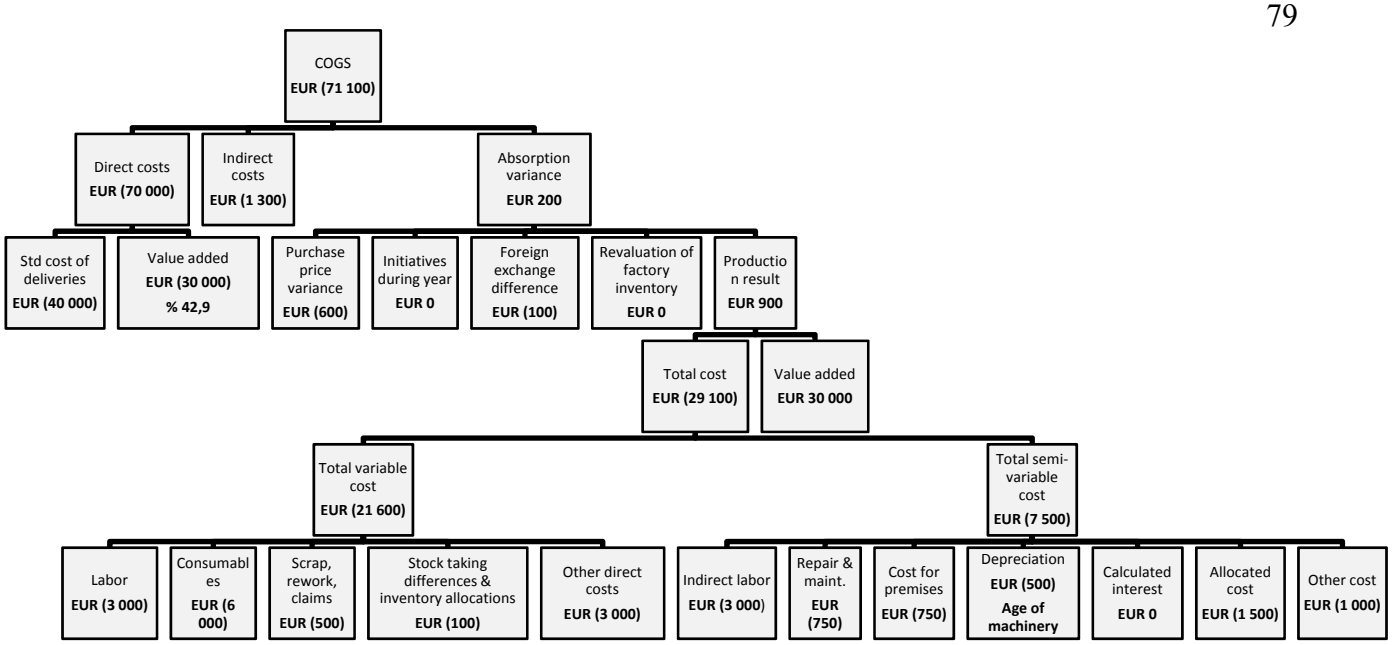


Figure 6.8. Performance measures for COGS.

The COGS hierarchy is still very backwards looking, and needs to incorporate the different views of customers, processes and future growth into the measurement system. This is work to be done by the sales organizations managers, in this case the plant managers and the managers of the plants. Some examples would be to include age of machinery to the depreciation-branch, to determine whether there seems to be a need for investments in the future. This can also be used as a method of sense making – a factory may be having low costs, partly affected by low depreciation costs, but this may not be a purely good thing, since it entails the need for new investments and increased costs in the future, or machine breakdowns and downtime in the case that the aging machinery isn't noticed.

Another example for further balancing the system for direct costs is to drill into the scrap, rework and claims costs – the quality costs. A traditional division of quality costs categorizes them into four categories. Prevention costs are the costs incurred in trying to prevent failures in production such as planning, training and supplier quality auditing costs. Appraisal costs are expended in the evaluation of quality in such activities as inspection and testing. Failure costs are the costs resulting from discrepancies, and are divided into internal and external failure costs. Internal failure costs include failures detected prior to delivery to the customer, and include costs such as cost of rework and scrapping. External failure costs result from failure found after delivery to the customer, and consist of processing customer complaints, returns, field service and warranty costs. An example of this further specification of quality costs is presented in figure 6.9.

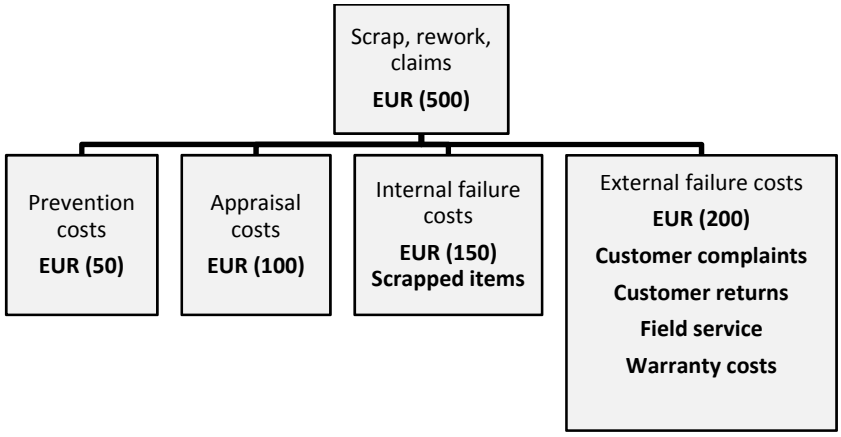


Figure 6.9. Further division of quality costs.

The next branch to consider is the net working capital branch. Net working capital consists of accounts receivable, accounts payable and inventory. Since accounts payable and receivable are not related to plant performance, only inventory will be relevant for plants. Inventory consists of finished goods, work-in-process (WIP), and raw materials and supplies. Each of the categories indicate different things: a growing finished goods inventory may indicate reducing demand or excessive production for other reasons, a large WIP inventory may indicate poor manufacturing processes, and a large raw materials supply poor allocation of capital or supplier relationships. Inventory value itself is not a sufficient measure for inventory performance, since it depends on the amount of activity. A better measure would be inventory turnover, as it takes it into account. Net working capital tree for plants is presented in figure 6.10.

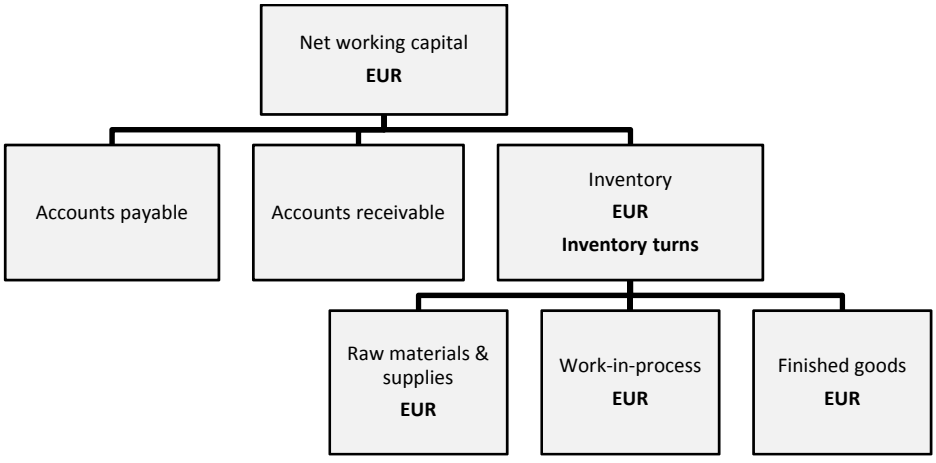


Figure 6.10. Net working capital performance measurement hierarchy.

The final branch is the fixed operative assets branch, which is relevant to plants. Plants may own buildings, land, machinery, etc. The branch for plants is illustrated in figure 6.11.

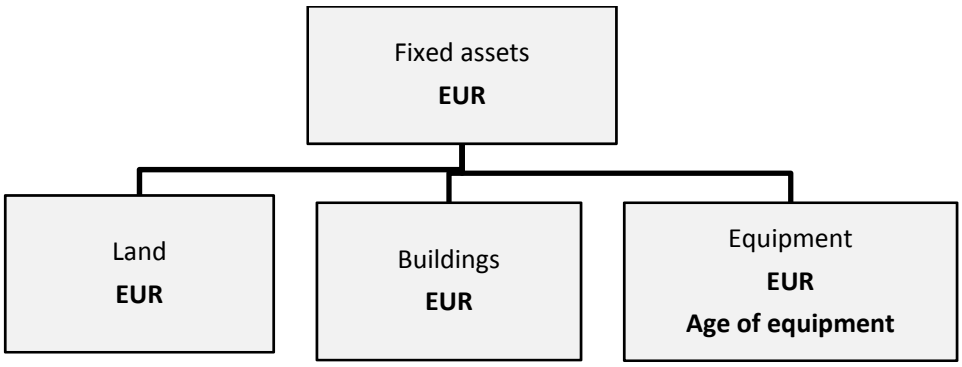


Figure 6.11. Fixed assets performance measurement hierarchy.

With all the relevant branches handled, a starting point for plant performance measurement system is now created. A rough estimate of the main activities and variables of plant performance have been mapped out, but more work on it is needed. At this point, the hierarchy includes numerous different measures, all of which could be used to measure the performance of plants. However, as has been discussed, a person should be measured by from two to five measures at a time. Therefore, a set of the metrics should now be picked from the tree to represent the wanted focus areas for the plant manager. This case example will be continued in the next chapter on the usage process of the system.

7. USAGE PROCESS

7.1. Objectives

One of the main objectives for the case organization is to encourage management based on the performance measurement system. Therefore, the usage process should support that aim. There is, however, another process that should also be taken into account, and it is keeping the measurement system up-to-date. As has been discussed in chapter 3.1.2, a performance measurement system must be able to renew according to the changes in the strategic environment. To facilitate this change, a process model should be devised. The aim of this chapter is to describe the way the system designed in chapter 6 should be used in the case organization, and what kind of processes it needs to support the utilization of the system, and keeping the system up-to-date.

As discussed in chapter 4.3, the performance measurement system's role in managerial work is to facilitate setting operative targets, alert of variations, and enable interactive use of control, as well as offer visibility into the organization. The management process should support these aims. System maintenance process on the other hand, aims to keep the system relevant for the organization it is used in. The concept of repair should be facilitated, so as to be able to modify and update the system based on experiences.

It should be noted that there is no single performance measurement process or cycle, but the cycles presented here should be applied in different levels of organization and across organizational functions. The cycle frequencies are demonstrative and should be modified depending on the organizational level and function. The examples here are built on the plant performance measurement for BU A and BU B, where the actors are controllers for these business units, manufacturing vice presidents, plant managers and other people seen as relevant.

In this chapter, two linked processes will be designed. The first one will be called planning process. The planning process is the more infrequent of these processes, and its purpose is to follow up on targets for the previous period, check whether the performance measurement system is still viable, correct it if it is not, and set targets and incentives for the next period. The second, more frequent process is called the management process. The management process is the active usage of the performance measurement system in managerial work. Next, each of them will be discussed in detail.

7.2. Planning process

The planning process can be thought of as a plan-do-check-act cycle. Deming first introduced this widely known management tool, in which management should plan the process, then execute the plan, review the results, improve the process, plan again, and continue this as a cycle in order to establish continuous improvement.

The annual planning process applies the logic of planning, doing, checking, and acting to the process of planning on an annual basis. The purpose is to maintain the performance measurement system as a tool of strategic control, and also to set targets for the management process and follow them up. The planning process consists of four parts: follow-up of results from the previous period, analysis of the performance measurement system, adjusting the performance measurement system and setting targets (figure 7.1). Next, each of them will be reviewed in detail.

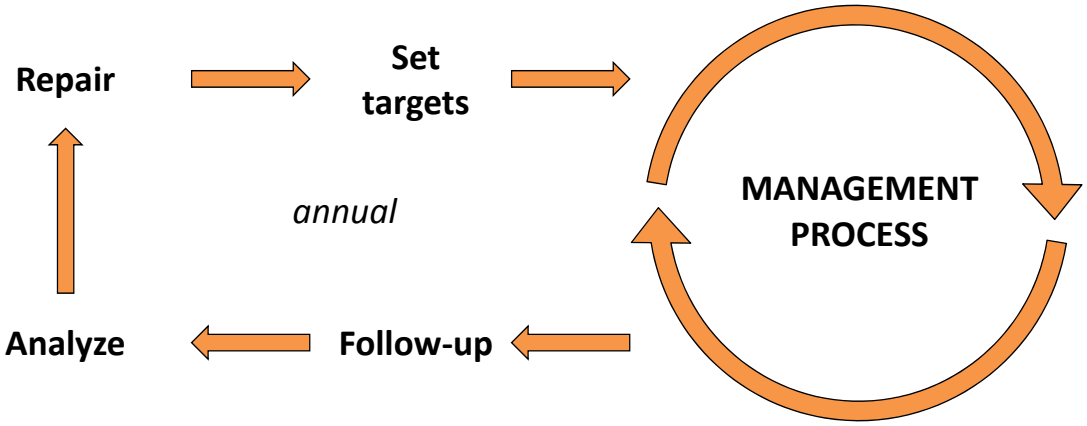


Figure 7.1. Planning process.

7.2.1. Follow-up

The first two steps of the annual planning process are to follow-up and analyze performance measurement system, which make up the "check"-phase of the PDCA cycle. Here performance on achievement of targets and the need for change in the performance measurement system will be reviewed. The first step is to follow up performance in the previous period. C-B stated in an interview that "follow-up is the key. There must always be a plan, follow-up and pressure." In this phase the performance on annual targets will be reviewed. Since performance evaluation itself is not the focal point of this thesis, the follow-up process will not be explored in further detail.

7.2.2. Analyze

Analyzing the need to change the performance measurement system can be done through the four categories of PMS change influence introduced in chapter 3.1.2. There

are two kinds of influences that have an effect on performance measurement system change: internal and external. In addition, there are two categories of issues that might pose impediments for performance measurement systems: process- and transformation-related.

Process issues refer to problems related to the implementation and use of the management process. Here, the validity, reliability and the relevancy of the performance measures should be reviewed and analyzed. Negative branch (chapter 2.1.5) may be used, or the issue might have come up during the use of the measure.

Transformational issues refer to broader problems faced with the fit of the performance measurement system and the organization.

In the process, internal influence will most likely present itself in the form of negotiation among the participants of the meeting. The performance measurement system will most likely be changed if the interests of the dominant coalition or the dominant coalition itself have changed. Thus, the internal influences are mainly related to the power structure of the organization and they would be difficult to review objectively. More likely is that the internal influence will present itself in all decisions made regarding to the changes of the performance measurement system. Moreover, strategic changes may have been done for internal reasons, which make it necessary to revise the performance measurement system to be aligned with the strategy.

External influence analysis includes the analysis of markets, competitors, macroeconomics, regulation and other external sources that have an influence on the organization. Here, for example it might be noticed that the cost competition has tightened, and the organization needs more focus on cost efficiency, or a regulator might have tightened the emission rules of plants. These would trigger adjusting of the performance measurement system. External influences may cause need for the organization to change its strategy, at which point the performance measurement system should be revised to match the changes, because a performance measurement system should at all times reflect the chosen strategy of the firm.

7.2.3. Repair

A performance measurement system should be capable of changing with the organization and its environment. This step of the planning process contributes to keeping the performance measurement system up-to-date, and makes up the “act”-phase of the PDCA cycle.

The performance measurement system consists of two dimensions that should be addressed: the structure of measures, and the measures themselves. It might be noticed in the analysis section, that the structure no longer is a representative description of what

the management believes are the causal links between financial bottom line results and the actions needed to get there. In this case, the structure of the performance measures should be changed. Structure may be changed dramatically, i.e. changing the whole branches, or by adding and removing certain measures.

In the previous example used the cost competition the organization faces had tightened, as well as the environmental regulation. The company might recognize a need to introduce a finer split of the components making up cost, such as quality costs. At the same time, it might be that as customers require low-priced products, the demand for very high performance is not of that high importance. If the organization had previously measured product performance in a detailed way, it might then suffice with a more aggregated measure for it, for example product lifetime. To make sure the organization does not suffer from the increased regulation, it would introduce a measure for the emissions required.

The other form of adjustment relates to modifying the individual measures. Through interviews and meetings with the organization's personnel, it was apparent that one of the key problems the organization faces with performance measurement is the variety of definitions interpreted for the same measure. Some plants even count the days of month in a different way. Making the definitions more accurate and harmonized is an ongoing process that need not limit itself to the annual planning process. However, sometimes there is a strategic need to make a clear change to how a certain measure is calculated, and the planning process offers a forum for this discussion.

7.2.4. Set targets

Target setting is a critical phase of the planning process, as it is the primary tool for management for prioritizing their subordinates' work. In the PDCA cycle, target setting represents the planning phase. The purpose is that as an outcome the subordinates have a sense of priorities in their work, what is expected of them, and within what constraints they should pursue the targets. The managers should not set more than five goals for a person, since as discussed in chapter 3.2.1, they start losing their effectiveness if subordinates are overwhelmed with them. Target setting is also an input to the data analysis performed in the management process.

7.3. Management process

Management process is the do-phase of the planning process' PDCA cycle. In the management process, the inputs of planning process are utilized in using the performance measurement system as a tool of management (figure 7.2).

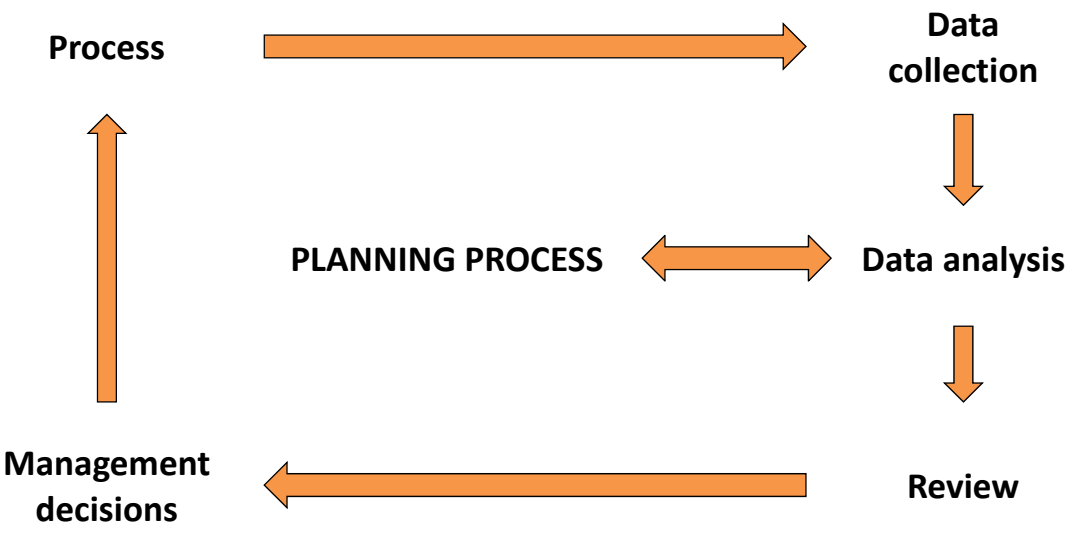


Figure 7.2. Management process.

The management process is itself an implementation of the PDCA cycle: here, management decisions represent the planning phase, process of transforming inputs into outputs is the do-phase, data collection and analysis form the check-phase and the review process is the act-phase. Management process attempts to tie in the cybernetic feedback model with the model for performance measurement system usage proposed by Salloum et al. (2010). Each of the steps will next be introduced.

7.3.1. Data collection

Based on interviews conducted, the future vision in the case organization for data collection is that all of the data could be automatically extracted from the ERP. However, the point in which the ERP can store information on such things as age of machinery, market share estimates, or the more detailed split of quality costs presented in chapter 6.5, is still in the future for the case organization, and is not a realistic objective to complete within even a year.

The organization does have a financial reporting system in place, which facilitates the reporting of top level financial numbers to the performance measurement system. For these numbers, a way to extract them automatically already exists and should be utilized in the data collection.

The data collection for other than the top-level financial data will have to be done manually. Currently the process of data collection for plants is that the local management of plants input data to Excel spreadsheet templates sent to them. This kind of process, as noted by the senior vice president and controller of BU B, brings with it different interpretations of the definitions of the measures, both accidental and purposeful. Another

negative effect of data collection manually is that it is relatively slow compared to extracted data. However, as C-B noted: “it’s kind of like reaching for the stars, and landing to the trees.” Even though there might be some who game the system, it is not taken that seriously at this point, because the fact that the plants are paying attention to the measure and improving on it, are already better than what has been in the past.

Letting the local management collect data for the performance measurement system has also some positive effects. First of all, as C-B noted, it gives the responsibility to the local managers, and so doesn’t require as much resources from the senior management. The data input will also be more credible to the local management, since they have prepared it themselves. Also sometimes there are valid reasons for modifying the inputted data, and the local management would know them best.

7.3.2. Data analysis

In the data analysis step, the data collected in the previous phase will be compiled and analyses will be prepared. In this phase, the input from planning process is critical, as it forms the point of comparison. The data collected are compared to the targets set in the planning process.

Management might have defined in the planning process that the net sales for the current year must grow 10 %. In the data analysis phase, analyses regarding to the net sales development year-to-date in relation to the target will be made.

The data analysis phase is the thermostat that triggers diagnostic and interactive control. If in the data analysis phase information that the net sales growth lagged behind the year’s target was created, the next phase would be to portray that information to management.

7.3.3. Review

Information is next presented to the management. The case organization’s management has typically reviewed financial information in a table form, but some criticism has raised from it not being simple enough and not highlighting the linkages between the line items. For improving the linkage between different items, usage of the performance measurement hierarchy model presented in chapter six is proposed.

For a more detailed review, however, usage of graphs and tables should be considered in the presentation, aided with the hierarchical linkages of measures. The format of graphs and tables has been approved by management and supported by literature. The key point in information portrayal is to present the information found in data analysis phase simply and effectively.

Reviewing the information is of key importance, as C-B stated. The purpose is to prepare the information to be utilized.

7.3.4. Information utilization

The information is typically utilized in one of three ways. Either the manager decides that the information is merely of informative value, building his or her knowledge of the working environment and does not act on it, or the information triggers action. As discussed in chapter 4.3, there are two ways a manager could then act on the information: diagnostic and interactive control. The selection depends on the kind of decision, and how manager perceives the information.

On matters the manager does not determine as critical to the success of the organization, and which are relatively easy to correct, the manager might refer to diagnostic control. An example of this could be that the manager learns that one plant's capacity is being underutilized, and decides to move production there from another plant. In this way, the performance measurement system alerted of a variation from the standard, and the manager decided to correct the matter by adjusting production between plants.

However, on matters of more strategic importance a manager might use interactive control. An example could be that the product line vice president learns that sales for one of his most important products have been declining. A search for reasons would begin, where he or she would contact subordinates and rigorously discuss and debate the reasons for the decline. The measurement of sales for that product group would then be used interactively. Interactive control, by its nature, would not stay within the boundaries of management process presented here, but instead the management process is the trigger for interactive control.

7.4. Example of usage: plant performance measurement

In the end of chapter six, the range of possible measures for the plant manager were prepared for demonstrative purposes. For the purposes of this example, a plant manager might be assigned the measures of absorption variance in order to keep the costs according to the plan, customer returns in order to improve product quality, LTIF in order to improve employee safety and manufacturing reliability to promote customer satisfaction. Assuming that there are measures in place and defined for these factors, the process would start by setting targets in the planning process. To the planning process should participate at least the plant managers and other relevant plant personnel, supply chain manager of the business unit, and possibly the business unit senior vice president, product line and manufacturing vice presidents. Targets might be set that the target for lost time incident frequency is set to zero, absorption variance target to zero, manufac-

turing reliability improved to 95%, and customer returns reduced by 50%. After the agreement on targets, the monthly management process would begin.

The data from the manufacturing plant would still be collected by spreadsheet templates in the beginning, and sent to the business unit controller or supply chain managers for analysis. The data would then be reviewed together by the controllers, supply chain managers, manufacturing vice president and plant manager. The targets are followed up and if variations from them are noticed, actions would be set in order to achieve the targets. In the next phase the plant managers realize the actions in the process. In the next management review, the results of the actions would be reviewed. This is the phase where interactive control may be launched if an important target such as LTIF does not seem to be achieved. A manager might start a more active process of looking into the reasons why LTIF in the plant is not meeting the expected targets.

In the year end, the planning process would begin again, with the follow-up on past year's results. Attention would be drawn to the performance on set targets. In the next phase, the situation would be analyzed from process and transformational issues, and internal and external influences. Process issue may have come up, that the plant lacks a good way to measure the development on absorption variance due to low visibility in financial data. Or there might be a transformational issue such as that the plant personnel have started to enter longer delivery times in order to be able to meet the set targets of manufacturing reliability. External influences may include that a government in which the plant resides in has tightened the emission rules, and internal influences that the organization has shifted its strategy towards emphasizing quality to customer.

These results of analysis would then call for repair in the system. The definition and information structures for the measure of absorption variance would need to be improved. In order to counter quoting longer lead times, the measures for plant managers might be changed so that manufacturing lead time is included into the set of measures. The target for LTIF might have been reached and it might be dropped from the set of measures under active monitoring to a more diagnostic role, alerting from variations. Instead, the plant could devise a new measure to control emissions in order to avoid sanctions from the government. This kind of repair work would be prepared participatively in the planning process. Finally, the last phase of the planning process would be to set targets for the chosen set of measures, after which the management process would begin again.

7.5. Summary of the utilization process

The two processes presented here, planning and management process, are linked to each other (figure 7.3). The management process is the do-phase of the planning process, where the strategic plans made in the planning process are put to work. Planning process provides input to the management process in the form of the revised performance

measurement system and targets for the data analysis. Management process, in turn, provides input for the planning process of the performance of the organization, and the usefulness of the performance measurement system.

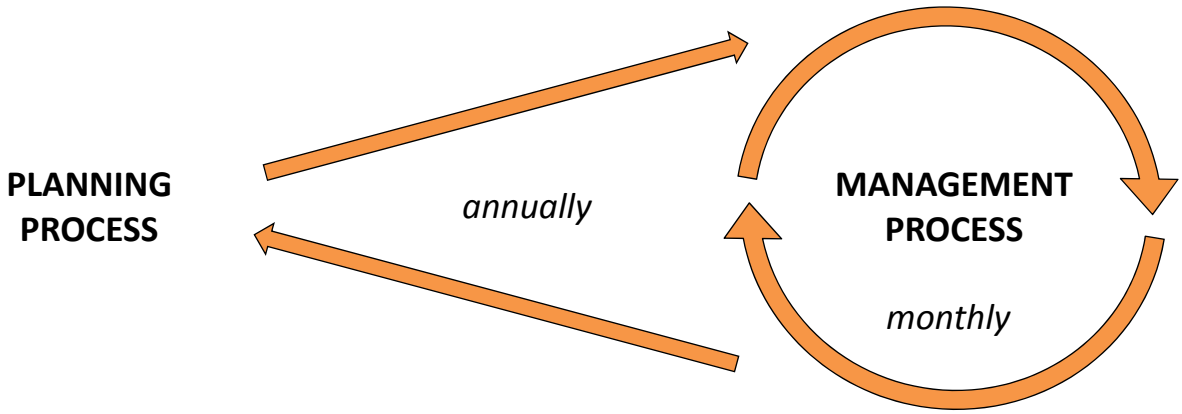


Figure 7.3. The performance management process.

It should be noted that the performance management process developed is still just a part of the management control processes and interlinked to them. Most notably, the process of long-range planning in the organization should act as an input to the planning processes target setting phase, and the rewards controls should link into follow-up phase.

By adapting the developed system and process the organization focuses attention to performance. When the process is an integrated part of the way the organization is managed, it links together the organizational levels and divisions, making possible the deployment of top level strategic priorities throughout the organization.

8. CONCLUSIONS

8.1. Review of objectives

In this section the research problem and the objectives for the thesis are reviewed and their achievement will be assessed. The research problem was "What is the role of performance measurement systems as a method of control in managerial work?" The objectives set for the performance measurement system and its usage process by the case organization were:

- Follow the guidelines given in the academic literature
- Enable visibility across the organization
- Focus attention to the organization's financial results
- Enable performance-centered culture in the organization

In order to evaluate the fulfillment of the first objective and the answer to the research question, a summary of the results will be presented. According to literature review, the performance measurement system should be considered in terms of its measures, the structure of the system, and the usage of the system (Neely et al. 1995; Bititci 1995).

The critical considerations regarding performance measures are that they should fill the criteria of validity, reliability and relevancy (Laitinen 1992), output should be the primary choice for target of measurement (Simons 2000), both financial and non-financial measures should be used, different perspectives of business, such as customers, internal processes, financials and innovation should be taken into account, and perhaps most important of all, the measures should be derived from the organization strategy (Kaplan 1994). In the empirical part it was noticed that the measures should be chosen in collaboration between the top management and the users of the measures in order to ensure their alignment to strategy, but also take into account the experience of the professionals.

In structuring the measures, the integrity and deployment of performance measures should be taken into account. The structure should be able to make explicit linkages from top level strategic objectives to shop floor operative targets. It also should be able to link the different divisions and functions in an organization. (Bititci et al. 1997) In the empirical part it was found that a hierarchical tree model of the performance measures is able to both integrate and deploy, since it makes explicit linkages between different areas of measurement. This also fulfills the second objective of achieving better visibility, and the third objective of linking all measures to financial results.

The maintenance of performance measurement systems was found to be an important part in designing a performance measurement system usage process, as the system needs to be able to change (Waggoner et al. 1999). This kind of flexibility is needed, since the market is constantly changing, and an organization changes its strategy according to that. To facilitate managers to feel that the performance measurement enables them to do their work more effectively and efficiently instead of coercing, in the usage process designed the principles of repair, flexibility and internal and global transparency were adopted. (Waggoner et al. 1999; Wouters and Wilderom 2008)

The performance measurement system ties into organizational processes via setting standards or targets for processes, and providing feedback information about the performance of the process against the standard (Simons 2000). Target setting then should focus on setting managers few and prioritized motivating targets that are aligned to the organization's strategy, backed up by incentive systems (Goold and Quinn 1990).

In the feedback loop managers use the performance measurement system as a method of control. The performance measurement system provides managers with information on the performance against set targets, and the managers decide the way they act or do not act on it. It was found that managers may use performance measurement systems in three ways: first, to build understanding of their environment, second in a diagnostic fashion, where variations from the target mean decisions will be made to correct it, and in the next round of performance measurement process the results will be reviewed again, and third, as interactive control, which is launched when an information system reveals a strategic uncertainty that has to be addressed more rigorously. In this case, the information will be debated and discussed with subordinates, and the manager personally intervenes in the process of fixing the situation. Interactive control may break out from the usual cycle of performance measurement. (Simons 1995)

Finally, answering the research problem, performance measurement systems are just one of the forms of control managers have available for them (Malmi and Brown 2008). Performance measurement systems are affected and build on the structure of the organization. Management set strategic objectives for the future, and attaches incentives and rewards for achieving them. The performance measurement systems support this process by translating strategic objectives to targets, which are then monitored through the process of feedback information usage. It was also found that performance measurement system may be used as vehicles of cultural change, through conveying the values of the firm.

The objective of the performance measurement system and usage process following the guidelines given in academic literature was thus achieved by conducting a literature review on the subject, collecting the most relevant requirements for a performance measurement system, and designing the system from that basis. The requirements were

achieved in the performance measurement system designed, and the usage process supports the recommendations for enabling control set by the literature.

Visibility across the organization is possible to achieve with the designed system. It is based on the linkage of organizational levels, divisions and functions. This means that the measurement system itself is an illustration of the organization from a performance point of view. Therefore, the performance measurement system includes the factors that affect performance in the organization, thus improving visibility in the organization.

The performance measurement system was built on the assumption provided by the case organization president that return on capital employed is the highest level performance measure for the organization. All other measures are derived from it, which ensures that focus will be centered in it.

A performance centered culture requires much more than a performance measurement system. However, the system was supported by a usage process that attempts to make the performance measurement system more of a management tool to be used regularly. One, unified system should increase organizational focus. However, this objective can only be confirmed to be achieved through practice.

8.2. Limitations and future avenues for research

It should be noted that even though this thesis discussed performance measurement systems normatively, it does not attempt to define the correct set of measures or areas of measurement, and all measures presented are for demonstrative purposes only. The literature reviewed, even though broad, is often theoretical and has little examples of concrete applications for performance measurement systems. This may affect the results of this thesis. Limitations for the applicability of the results of this thesis might be that not all important people could be covered in the process of designing the structure and usage process. Especially not having the president of the organization as an active participant of the process might limit the usage of the system.

In the future, the literature should focus more on the actual implementation and usage of performance measurement systems as a method of control. A problem for building the theoretical body of using performance measurement systems is the fragmentation of the literature to several competing models of performance measurement systems and categorizations of management control systems. This thesis added to prior literature on using the model of management control systems as a package, and it is suggested that future research continues on using existing typologies.

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