Towards dynamic performance measurement systems

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EXECUTIVE SUMMARY

The purpose of this report is to single out the most critical aspects for evolving and dynamic performance measurement systems. The report concludes that the existence in practice of theoretically important aspects are diverse and that the most appropriate way of governing the aspects are through the creation of a performance management process.

The theoretical chapter is established for dual purposes. The first is to give the reader a comprehensive understanding of what has been done in the field of performance measurement and management so far and the second is to answer the first research question imposed.

The empirical chapter investigates to what degree the existence of factors singled out in theory are present in practice. Two extensive case studies are presented. Further, the chapter also answers research question two.

Finally, the result and analysis chapters focuses on cross-analysing the case studies made and to generate a recommendation. Research question three is answered under these headings.
ACKNOWLEDGEMENTS

This one year journey has been more giving than I could have ever imagined. Just as a former PhD student warned me about before initiating this report, there has been ups and downs. I would like to show my appreciation for the people supporting me during this rollercoaster ride.

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INTRODUCTION AND POSITIONING

This chapter aims to generate an understanding of why the research project has been executed and the importance of it. The chapter is structured with a traditional background and problem description that gives the reader a solid base. Furthermore the chapter describes the purpose of the project and formulates the research questions. Ultimately the boundaries, researcher’s role and the expected outcome are discussed.

1.1 BACKGROUND

The volatile market situation for construction equipment in combination with the rapid decline of demand for Volvo Construction Equipment (VCE) products has accelerated the pressure for a more responsive measurement system. Paradoxical, the current way of managing performance at VCE Operations Eskilstuna is flawed from several points of view.

The performance measurement system at VCE Operations Eskilstuna lacks a supportive management process linking top and bottom levels of the organisation creating a critical gap in the cascading of strategies and goals. The short term consequence have been lagged decision-making and ad-hoc solutions surrounding performance related issues. The long term consequence will most likely be costs of restructuring due to the vague continuous management and maintenance of the measurement system. The restructuring would involve actions to
update information systems for data collection and actions to revise measures due to strategic and organizational change. A performance measurement system without the capability of dynamic adjustment to contextual change is not efficient. Further, with the linking process between the macro and micro levels of performance management absent, the risk of managing the company with biased and misleading measures is impending.

Operation Eskilstuna is seeking to attain a performance oriented culture and has initiated several concepts with the purpose of rolling out a new company culture. However, the sheer quantity of the frameworks has caused perplexity within the organisation and has accentuated the absence of an all-embracing performance management process. Further, the lack of integration between the strategic and financial processes has amplified perplexity.

The deficiencies mentioned above make it difficult for the company to manage and communicate strategy. The shortcomings become even more obvious in sharp cyclical fluctuations and rapid organizational change. The non-existence of a documented process of working and evaluating measures is obvious. Each department has implemented a specific way of working and definitions in regards to partial measurements often differ between departments.

The organization has a strongly goal-oriented culture and this is a crucial part of the problem. Working purposefully with biased measures increases the risk of steering the organization towards the wrong direction.

1.2 Problem Description

There is a clear demand for an evolving measurement system in both academia and industry. The demand seeks a measurement system robust to non-relevant interference but simultaneously sensitive to relevant changes. The non-existence of a performance management process at VCE Operations Eskilstuna makes the evolution of the measurement system ad-hoc.
1.3 Purpose

The purpose of this study is to define and formulate an evolving and dynamic measurement system for VCE Operations Eskilstuna.

1.4 Research

In order to develop a performance management process, the following research questions has been defined.

RQ1 – what are the critical aspects of an evolving and dynamic performance management system?

RQ2 – What specific improvements of the critical aspects are needed at Volvo CE Operations Eskilstuna?

RQ3 – What is needed to implement the improvement of the critical aspects at Volvo CE Operations Eskilstuna?

1.5 Delimitations

The project is part of a one-year research programme named PREPARE. The programme is created through collaboration between Mälardalen University, the KK foundation and the region of Mälardalen. The research is conducted in an interactive environment where study and work are executed at both university and workplace interchangeably. Furthermore, during the research programme the researcher's work tasks at Volvo CE are linked to the project. As a participant of PREPARE the researcher's role is to create knowledge that is relevant both for academia and industry with an emphasis on the industrial relevance.

The delimitation will cut at the performance management process. It is of utmost importance to stress this due to the fact that most large corporations have employed balanced score cards to measure cascading strategic objectives. These score cards are as often built up by multiple key performance indicators with vague boundaries. Further, the
exercises of choosing the measures and validating the hypothesis on which the strategy rests is out of the scope.

1.6 EXPECTED RESULTS

The expectation is that the report will contribute to a map of the critical aspects of an evolving and dynamic performance management system. Furthermore, the ambition is that the research will investigate to what extent the essential aspects has been implemented in practice. A final expectation is that the current performance management structure at Volvo Construction Equipment will be altered towards the findings of this report.
RESEARCH METHODOLOGY

This chapter intends to highlight the researchers’ scientific views. Furthermore, the chapter aims to present and justify the choice of research through a discussion that includes strategies for data collection. Finally, the chapter will present the methodology for quality assurance.

2.1 METHOD

In the PREPARE research initiative with Mälardalen University, KK-foundation and a selected league of industrial companies in the region of Mälardalen, the research purposes to present results relevant to both academia and industry. In order to create dual relevance the research ought to move constantly between practice and theory in an iterative process combining theory with real world contact (Fagerström, 2004). This approach is of essence to obtain the requested relevance (See Figure 1). In order to create common knowledge, interactive research will be conducted. The researcher will study together with practitioners (Brulin, Ellström, Svensson & Widegren, 2002).
2.2 RESEARCH APPROACH

Research can be conducted from several different methodological approaches. Arbnor and Bjerke (1994) have classified three different research approaches (Figure 2):

- The analytical approach is positivistic and assumes that reality is objective.
- The actors’ approach is a hermeneutic view and sees reality as a social construction.
- The system approach is more closely related to the positivistic manner than to the hermeneutic approach and assumes that reality is objectively achievable where various partitions interact through relations and that the ultimate understanding can be reached through mapping.

Figure 2. Methodological approaches related to paradigms (Arbnor & Bjerke, 1994).
The field of application differs between the approaches of research depending on various factors. The positivistic approach is usually used in the field of nature science due to the view of an objective reality while the actors’ approach is more frequent in the field of social science where reality is subjective and dependent on factors such as time and culture. The approach bordering to both sides of the extreme, the systems approach, is usually summoned in complex contexts where connected activities are to be evaluated.

Positivism is according Arbnor and Bjerke (1994) an analytical approach that can be expressed as an extension of the methods of natural science to social sciences and related business economy. Positivism is an approach of science that considers knowledge to be based on systematic experiences and assumes that experience is empirically testable. Furthermore, the positivistic approach is seen as explanatory knowledge due to the direct adoption and application of natural science methods to social science (Arbnor and Bjerke, 1994). The understanding knowledge and hermeneutics is in contrast to positivism and the declared knowledge (See figure 2).

The choice of approach depends primarily on the researcher’s personal views in regards to knowledge and the research questions that he has formulated. The researcher has in this thesis taken a systems approach to the research questions. This claim is based on the fact that the research conducted will analyse and scrutinize the different components that a performance management system consists of.

A positivistic approach will be applied when scrutinizing performance measurement metrics. The researcher has not been seeking to define hermeneutical or system-based factors related to performance measurements. Furthermore, the research never intended to test complex data collection systems or analyze the interaction of its components in relation to isolated performance measures. However, it is obvious that a performance measurement system will work in an open production system, heavily influenced by its temporal, cultural and social context. The final applicability and functionality can depend upon a number of non-analytic factors not considered in this positivistic-based approach. Further, the approach is based upon a limited number of industrial studies. This is however always the case in this kind of case study-based research, where analytical
generalisation is used in contrast to research based on statistical generalisations (Yin, 1991).

2.3 RESEARCH PROCESS

The research has been conducted in accordance to the outline of the PREPARE programme developed by Mälardalen university, the KK-foundation and the selected league of industrial companies in the region of Mälardalen (See figure 3). The pre-study was initiated with a project definition. The second step was then to analyze the current situation and describe the existing problems and delimitations. Step three was to execute the intensive phase of the state-of-the-art mapping. When reaching the stage of problem analysis the empirical collection started with two case studies. Finally a solution was presented.

Figure 3. The PREPARE programme outline.

2.4 STRATEGIES FOR DATA COLLECTION

Literature advocates different strategies of data collection depending on the context and purpose of its use. Barnes (2001) has drawn the rational conclusion that each approach has its advantages and disadvantages. Following are five types of strategies according to Yin (1994).
• Experiment focuses on contemporary events in controlled environments and is best meant for questions based on "how" and "why".

• Surveys apply best when questions are based on words such as "who", "what", "where", "how many", "how much" and focuses on contemporary events.

• Analysis of archived data is most appropriate for "who", "what", "where", "how many" and "how much" questions. This type of approach is best suited to issues related to contemporary and historical events.

• History is best suited for historical "how" and "why" questions.

• Case studies are best designed for contemporary "how" and "why" questions.

It is not always obvious which strategy to apply. According to Yin (1994) the selection of strategy depends at large on three factors. Type of research question, level of control the researcher has over events and level of focus on contemporary versus historical events (Yin, 1994).

2.5 DATA COLLECTION

Literature study

A thorough literature study has been executed. The literature study continued throughout the research study but the extensive work was done initially. This study has been used as Yin (1994) argued, to develop sharper and more profound research questions. Furthermore, the literature study falls in line with Routio’s (2004) view that it exists to essentially clarify the problem and create a perception of what other attempts to solve the problem has left. Literature study topics include; performance metrics, productivity system, performance management, strategic management and general strategic theory.
The Descriptive Case Study

The case study process has followed the process map suggested by Yin (1994) illustrated in figure 4. The starting point has been the theoretical framework developed through extensive research through the field. When a somewhat clear picture of the academic landscape was generated the focus shifted to the selection of case studies. The choice was made to focus on two case studies due to wide grasp of the performance management process.

The next step was to design a data collection protocol. Two components created the base to the protocol used throughout both studies: analysis of archived data and a comprehensive interview study:

Observations of archived data – Includes the financial data base, information systems, operational manuals and processes of the company case studies. Financial data is used when assessing how financial measures are related to the strategic objectives and hypotheses. The capabilities of the information systems are briefly investigated and operational manuals and processes are scrutinized in order to decide the level of standardised and structured way of working.

Interview study – A comprehensive interview study with members of the executive production board of the chosen case companies. The interviews were conducted in three parts. Open interviews, semi-structured interviews and an ending questionnaire. The reason for the chosen mix of interview forms is due to the variety of components surrounding a measurement system.
The next step after designing the data collection protocol was to execute the first case study. As the author is employed at the case company much of the information had already indirectly been retrieved over the last two years through observations, informal discussions and formal meetings. Still, an interview study and analysis of data were conducted. The second case study was conducted at a manufacturing site belonging to the same company. However, the same level of information was never reached in the second study due to cultural, personal barriers and the short time for the study. Having that in mind no interferences were made in the collection of data and the same freedom applied as in the first case study. The biggest difference in the two cases is that the author could anticipate the result of the interview study before conducting it while in the second no expectations whatsoever were done.
After the execution of the case studies the material was gathered and analyzed in a structured manner. Case reports were summarized for each site and then compared to each other. Finally, based on the case studies and the cross-case analysis a recommendation was derived, as suggested by figure 4.

Analysis of archived data

The research questions in the thesis have placed great emphasis on analysis of contemporary and historical information. To determine the relevance of metrics and influencing factors related to the performance management system the research needs to apply a strategy for data collection that suits both contemporary and historical events. Furthermore, the chosen strategy need to be appropriate for research questions based on words such as "who", "what", "where" and "how many".

With the above requirements in mind the choice of strategy of data collection fell on analysis of archived data. According to Yin (1994) the chosen strategy is suitable for financial research. The disadvantage of the strategy is the limitation of data that researchers sometimes encounter (Yin, 1994). In this case however the researcher had unlimited access to archived data because of his employment at the company where the research as been conducted.

The empirical information analyzed came almost exclusively from Volvo Construction Equipment’s archives of data. The analysis focused on historical financial ratios, influencing performance measurement system parameters and factors related to performance management.

Interviews

According to Yin (1994), interviews are one of the most important data sources in a case study. The purpose of the interviews is to create a suitable passage for theory to meet practice.

The sessions started of with an introduction to the subject and overall goals with the interview study by the interviewer. Further, the purpose and use of the material was disclosed. The interviews were divided into four phases. Firstly, background variables were collected. Then the actual empirical collection started with an open form to allow the
interviewee to communicate her perception of the performance management process at the case company. The next step was then to introduce semi-structured questions with the purpose of mapping out the theoretical components of a performance measurement system. Finally a questionnaire with nine questions were handed the interviewees focusing on rating the strength of the components. On average the interviews took 45 minutes to conduct and all material was recorded. Each interviewee received a copy of their interview in a scripted form to provide a final validation before analysing the material.

The questions in the interviews have been based on information collected during the literature study and analysis of archived data. The persons interviewed have been members of the management board for production at the case companies. However, exceptions were made for persons not belonging to the management board but deemed to have made critical observations of the situation at the company.

2.6 ANALYSIS OF DATA

As previously discussed, the researcher has aimed at creating knowledge with both practical and academic relevance. The common knowledge has been generated through interactive research.

Figure 4 visualizes the approach of analysis that the researcher has applied. The researcher has analyzed empirics and theories simultaneously in multiple rounds. The purpose of the chosen strategy of analysis was to ensure that generated results was and remained practically and theoretically relevant during the entire research process.

The literature study has, as Figure 5 indicates, been held at a horizontal level. The aim at the initial phase was to define and clarify terminology surrounding the topic. The generated theory related to the terminology was then compared against the practitioner’s perception of the terminology.

During phase two the literature study became more specific. The aim was to assess the vital characteristics of a performance management system. An analysis of the most influential theoretical works in the
field of performance management was executed. These were then benchmarked against the results of the interviews with practitioners.

Phase three of the sequential approach of analysis intended to answer research question 3. The researcher assumed that the definition of the terminology is identified at the beginning of this phase.

The empirically tested theories in the two opening sequences were reconciled with the final phase of the literature study that, at this stage,
was strongly focused on the critical aspects of a performance management system. The measurement which met the criteria related to the analysis in phase two was then empirically analyzed via historical data from Volvo CE’s databases.

Finally, the work has been validated through academic discussions, industrial presentations and an academic article.

2.7 Validation and Quality Assurance

To ensure that research results are reliable and useful, validation is of utmost importance. According to Olesen (1992) the validation of a research is based on five aspects;

- **Internal logic** - Research results are based on accepted theories and a logical flow exists through the entire work
- **Truth** - The theoretical and practical results can explain real phenomenon.
- **Acceptance** - The theories used in the research are generally accepted by other researchers.
- **Application** – Correlation between the degree of application and quality of findings and results.
- **Innovative thinking** - New solutions or problem approaches are presented.

The validation of acceptance, innovative thinking and internal logic is ensured by the academic article that has been derived from this thesis. The article was presented at the Swedish Production Symposium (SPS09) in Gothenburg in the beginning of December 2009.

The truth has been validated continuously since the author has conducted interactive research. The research results were rooted with the practicing society in sequential fashion. The application factor was covered during the data collection phase in which metrics and components generated in theory were applied to data from Volvo Construction Equipment’s databases.
FRAME OF REFERENCE

This chapter introduces the theoretical framework applied in the research conducted in the field of performance management. Three sections separate the chapter: The historical aspect, performance measurement systems and critical dynamic factors. Initially, the theoretical development from the days of Henry Ford is mapped out. Secondly the performance management frameworks with highest academic impact are introduced. Finally, the factors critical to a dynamic performance management system are highlighted.

3.1 DEFINITIONS

This chapter will start off with defining critical terms in the report for the sake of clarity.

Performance measure - A measure used to quantify efficiency and effectiveness of taken actions (Neely et al., 2005). The terms Key Performance Indicator (KPI), metric and measure will be used interchangeably throughout the report.

Performance Measurement System - The set of metrics used to quantify efficiency and effectiveness of taken actions (Neely et al., 2005)

Performance Management - The process of managing strategy through business improvement methodologies and supported technology (Cokins, 2004).
**Productivity** – The ratio of what is produced to what is required to produce it. Productivity measures the relationship between output such as good and services produced, and inputs that include labor, capital, material and other resources (Hill, 1993).

3.2 Why Performance Management?

Lord Kelvin once said “When you can measure what you are speaking about, and express it in numbers, you will know something about it [otherwise] your knowledge is of a meagre and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely in thought advanced to the stage of science” (cited in Tangen, 2004).

There is a plethora of well-rehearsed proverbs to apply when discussing performance management and performance measurement systems. An increased research evidence indicate that measuring firms outperform non-measuring firms financially, in management of change and in being perceived as industry leaders (Lingle and Schiemann, 1996). Hence why the concept has generated a great amount of attention for some time without signs of stagnation.

For the last two decades performance metrics has been in focus in an ever-increasing number of fields (Folan and Brown, 2005). One of the most central arguments for performance measurement systems is according to Lynch and Cross (1991) the assurance of aligned tasks and actions with strategies and objectives. Ghalayini and Noble (1996) develops the argument further and argues that in order for companies to ensure achievement of their goals and objectives performance measures are used to evaluate, control and improve production processes. Performance measures are used to compare the performance of different organizations, plants, departments, teams and individuals, and to assess employees.

Organisational performance has always influenced actions taken by companies. The means of accurately measuring performance is perceived as increasingly important in field of performance both for academia and practice. The concept plays an important role in operations management. Operations management play an integral part in strategic management coming to translating strategic visions to
actions. Therefore can performance measurement systems be perceived as the tools to link strategy to action (Barnes, 2008). Bourne et al. (2000) asserts that the use of performance measures is split into dual branches. Primary, the initial area is to monitor the success of strategy implementation (Kaplan and Norton, 1996). Secondly, the feedback generated from measures should be used to challenge and test the validity of the strategy and the set of hypothesis underlying it (Kaplan and Norton, 1996).

Another solid argument is the fact that what gets measured in an organization does have a behavioural impact influencing employee behaviour making the choice of what to measure a key decision (Neely et al., 2005). According to Waggoner et al. (1999) the most frequent mentioned reasons for implementing measurement systems are:

- Monitoring of performance
- Identification of areas that are in need of attention
- Enhancing motivation
- Improving communication
- Strengthening accountability

3.3 A HISTORICAL APPROACH

According to Barnes and Radnor (2007) the literature of performance management and measurement systems can be divided into three distinctive time periods in continuous evolution; the early twentieth century, post world war two and mid 1980s. The cutting point between the eras should not be seen as revolutionary and sudden but bevelling. However, Ghalayini and Noble (1996) perceives the literature to be divided into only two phases, 1880s and 1980s. This report has not made a clear distinction between the time periods.

3.3.1 HENRY FORD AND TAYLORISM

The origins of performance measurements can be traced back to Frederick Taylor and the era of scientific management. Taylor built his
philosophy around the thesis that management was responsible of devising the most efficient method of performing work. Scientific management derived and implemented new and improved methods of working via analysis of existing work methods through measurements and observations. The performance of the new methods of working was then closely monitored through metrics.

Taylor’s scientific management framework built around increasing the efficiency and output of the individual worker. The framework advocated financial incentives to individual workers that increased efficiency and output. The financial incentive evolved to performance measures to monitor the progress of the labour force. Performance measures were only used at a micro level for measuring productivity whilst operation managers focused on financial figures generated by cost accountants to monitor the macro level of the company. With the push system of the early twentieth century volume and cost (hence productivity) were the only variables monitored and with the heavily labour weighted manufacturing of that time it seemed rational. Performance measures were derived from management accounting systems and emphasised cost with a rigid focus on financial measures such as productivity, profit and return on investment (Rolstadås, 1998). The application of Frederick Taylor’s framework had a great impact on the success of western industry in the beginning of the 20th century.

3.3.2 HUMAN RELATIONS MOVEMENT

In the aftermath of the Second World War the dominance of measuring efficiency and cost perished. Simultaneously the human relations movement amplified its influence through Elton Mayo’s Hawthorne experiments and Abraham Maslow’s hierarchy of needs theory. The famous experiments at Western Electric’s Hawthorne plant became acknowledged as groundbreaking and provided new scientific foundations for management (Smith, 1998). The studies were conducted between the years 1927 and 1932 and examined productivity correlated to work conditions. The researcher found that the people were motivated by more than financial incentives and that that employees achieved best and generated most motivation in a humane milieu. The part of the experiment that evolved around the constructive effects of benevolent supervision and affection for employees that
made them feel like part of the group is today known as the Hawthorne Effect (Geber, 1986).

During the 1950s and 1960s Taylorism was labelled as an autocratic management style inappropriate and obsolete in a democratic era. At the same time unemployment rates were low and employees had suddenly gained increased choices in terms of where to work. Increased quality of working became paramount to employers in order to retain and attract qualified personnel. Workers were given amplified influence in affecting work practice and the way of working. Performance measures at micro and individual levels started to gradually vanish, while measures of team performance started to gradually increase.

3.3.3 TOYOTA AND TOTAL QUALITY MANAGEMENT

In the 1970s the unquestioned position of the American management style became challenged as western manufacturers where pressured by acute competition from overseas, in particular Japanese manufacturers. Globalisation started to change the rules of making business, trade barriers were lowered and successful companies started to compete in an international arena and regarded the world, and not only their nations, as their market (Rolstadås, 1998). Consumers experienced that the Japanese goods were superior in both quality, variety and competitively priced. Western manufacturers were forced to overlook their practices, they realised that the increased complexity of organisations and the markets entailed by globalisation made solely financial measures as performance indicators obsolete (Kennerley and Neely, 2003).

The most apparent difference between western and Japanese manufacturers was that the former solely focused on efficiency while the latter equally emphasised both efficiency and effectiveness. In order to recapture the cutting edge, western companies re-evaluated their strategic priorities from solely cost to delivery precision, lead time, built-in quality and flexibility. New measures were generated to reflect the concern of effectiveness and philosophies such as Total Quality Management where introduced (Ghalayini and Noble, 1996).
This resulted in an enlightening of the limitations of traditional financial metrics. The traditional measures were derived from management accounting systems and emphasised financial metrics. These metrics have their origins in the operating management of textile mills, steel mills, railroads and customized retail stores (Ghalayini and Noble, 1996) and are deemed to be historically focused. Najmi, Rigas and Fan (2005) argue that traditional accounting performance measures fail to convey strategies and priorities in an effective manner within an organization. Further the impact of the shift in correlation between the tangible book value and market value of firms made an impact of the shift of era. A study conducted 1982 concluded that tangible book values represented 62 per cent of the market value of industrial organizations. In contrast similar studies at the turn of the century the tangible book value only represented 10 to 15 per centage of the market value (Kaplan & Norton, 2001). In the process of creating value the influence of tangible assets has diminished over time and focus have been inevitably pointed at intangible assets such as customer relationships, innovative products, high quality operational processes, efficient information systems and databases and employee capabilities.

Measuring performance via solely financial measures is heavily criticized in both practice and academia. Consensus prevail in the opinion that cost based systems such as traditional measures are insufficient as a management tool in the contemporary markets with rapid change and acute competition (Kennerley, Neely, 2003). Ghalayini and Noble (1996) argue that traditional measures are out of context, lagged, lacks alignment with strategy, not quantifiable in operational terms, expensive and inflexible. Kaplan and Norton (1992) take it further and argue that traditional measures totally lacks customer and competitor perspectives and are too internally focused. Skinner (1974) agrees and debates that traditional financial measures lacks a strategic foundation and fail to succeed in delivering data on quality, responsiveness and flexibility.

When the new “non-traditional” measures arouse with characteristics revolving around vertical and horizontal alignment between metrics and strategies, a focus on operational measures that are useful for everyday decision making, being more palpable the further they are broken down, and an ability to adjust to change in the marketplace
Measures that report yesterday's financial results are inadequate in regards to the factors that are paramount to larger market shares and higher profits such as customer service, first-time quality, employee development, and R&D effectiveness (Neely, 2002).

A growing recognition that operations had a strategic role to play evolved and managers wanted to know if their operations were achieving appropriate levels of performance (Neely & Austin, 2000).

In the transition between 80s and 90s, business process re-engineering (BPR) gained dominance. Business process re-engineering is defined by Hammer and Champy (1993) as:

“The fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as costs, quality, service and speed”

The main principle of BPR was the view of an organisation as a set of processes. This promoted a strategic view of operations and gave rise to assessment beyond cost and quality to speed, delivery, and dependability (Slack et al, 2005). Within operations, balanced and multi-dimensional measure concepts were generated. These concepts were forward looking with an emphasis on non-financial, external measures (Bourne et al, 2000). According to a management survey conducted in 15 countries around the world and published by Darrel Rigby in 2001, 30 to 60 per cent of firms have adopted the balanced scorecard (see section 3.5.4.). The concept of the balanced scorecard has become the most distinctive symbol of the new way to measure.

3.4 Analysis of Research Made

Andrew Neely conducted a citation/co-citation analysis published in 2005 as an update of a more extensive literature review of the academic study in the field of performance management executed in 1995. The result undeniably pointed at the dominance of Robert Kaplan and his balanced scorecard concept. However, the academic studies conducted so far in the field are perceived as immature. To strengthen this, Neely analysed the citation/co-citation analysis at depth. The 1352 articles in the analysis included 31,646 citations to 16,697
authors of 25,040 works. The top four most cited authors are from different disciplines within the field, Bob Kaplan from accounting, Andrew Neely from management, Rajiv Banker from operations research and information systems and Abraham Charnes mathematics and operations research (Neely, 2005). Only 10.2 per cent of the total citations came from the top-ten most frequently cited journals. The wide diversity of the material points at a wide distribution and lack of consensus of the theoretical core in the field of study within performance management as subject in academia (Neely, 2005).

Further, Neely estimated that between the years of 1994 and 1996 3615 articles on performance measurement were published alongside with books at a rate of one every 2 weeks in the United States alone (Folan and Browne, 2005). In a similar statistical breakdown of the performance measurement association’s conference between 1998 and 2002 Marr and Schiuma (2003) generated a result strengthening the findings of Neely from 2005. The dominance of Robert Kaplan and the balanced scorecard is evident throughout the scope of the analysis.

3.5 PERFORMANCE MEASUREMENT SYSTEMS

Performance measurement systems has come and gone over time with various impacts. The evolution of the systems provides an adequate picture of how the field of performance management has changed. Below follows an outline of the most influential measurement systems.

3.5.1 THE PERFORMANCE MEASUREMENT MATRIX

The performance measurement matrix is one of the older systems existing. Performance is here measured by a four dimensioned matrix. The matrix is split into four cells: external/cost, external/non-cost, internal/cost and internal/non-cost (Keegan et al., 1989). As illustrated by figure 6, the system is founded on four pillars:

- Performance measures must be derived from strategy
- Performance measures must be integrated vertically and horizontally

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- Performance measures must be supporting the multidimensional environment
- Performance measures must be based on a thorough understanding of cost relationships and behaviour.

The authors argue that performance measurements trigger actions from management and therefore it is of utmost importance that measures are derived from corporate strategies and are integrated vertically and horizontally.

![Performance Measurement Matrix](image)

**Figure 6. The Performance Measurement Matrix (Keegan et al., 1989).**

Metrics need to be measurable on each hierarchical level and the further measures extend down the organisation the more specific they need to get. Telling an operator at the factory floor to increase return on investment will not generate anything but setting up measures of scrapings per unit and delivery precision for each factory cell or work centre will trigger actions that in the long run will amplify return on investment (Keegan et al., 1989).

The system need to measure the whole multidimensional environment with indicators both internally and externally. The purpose of the design of the performance measurement matrix is to give a holistic view of the overall performance of the company. Finally focus should be on cost drivers and generated measures need to be based on a sound and thorough understanding of cost relationships and behaviour. This is
because cost, according to the authors, is the most important basis of performance measurement.

3.5.2 Sink and Tuttle Model

A classic performance measurement system is the Sink and Tuttle model. The model defines performance as a complex interrelationship between seven criteria, illustrated in Figure 7;

- **Effectiveness** – This involves doing the right things at the right time with the right quality. Expressed as the ratio of actual output divided over expected output.
- **Efficiency** – Doing things the right way, expressed as the ratio of expected consuming of resource over actual resources consumed.
- **Quality** – A wide concept, therefore this criterion is measured through six checkpoints; quality management process, inputs, outputs, downstream systems, upstream systems and transformation value adding process.
- **Productivity** - Defined as the traditional input to output ratio.
- **Quality of work life** - An essential contribution to a high-performing system.
- **Innovation** - A key element in sustaining and improving performance
- **Profitability / budgetability** - Represents the ultimate goal for any organisation.

Having the first three performance criterion in place is a prerequisite for a productive organisation. Further, quality of work life and innovation are moderators. They can either decrease or increase performance. Producing high level performances at these criterions amplifies profitability in short-term and supports the long-term goals of survival, excellence and growth (Tangen, 2004).

The industry and business environment has changed since the release of the model. However the above criteria are still deemed important to business.
The model has several limitations. It does consider the need for flexibility, which is considered to be a strategic priority. Further the model lacks consideration for the customer perspective.

3.5.3 TOPP PERFORMANCE MODEL

A framework constructed within the TOPP Project views performance as an integration of three dimensions, illustrated in Figure 8:
The first two dimensions have the same definitions as in the Sink and Tuttle model. The additional adaptability dimension gauges the extent to which a company is equipped for future changes (Tangen, 2004).

TOPP was a productivity study carried out in the Norwegian manufacturing industry between 1992 and 1996. The study was sponsored by the Norwegian Research Council and had as overall goal to focus on the total productivity for the whole enterprise and stimulate an industrial climate that improves competitiveness. The key objectives of the study were time to market, quality, flexibility and total cost (Rolstadås, 1998).

3.5.4 THE BALANCED SCORECARD

The balanced scorecard was developed 1992 by Robert Kaplan and David Norton. The authors describe the scorecard as the cockpit of an airplane. In an airplane, the pilots need information about several aspects in order to navigate and fly, in comparison a manager needs to view and gauge performance from several areas simultaneously in order to run a business. The idea of the balanced scorecard is to use a balanced set of measures to allow executive managers to take a quick but comprehensive look at four crucial aspects of business. These aspects are derived to provide answers to four paramount questions illustrated in Figure 9:

- How do we look to our shareholders (financial perspective)
- What must we excel at (internal business perspective)
- How do our customers see us (the customer perspective)
- How can we continue to improve and create value (innovation and learning perspective)

The concept refutes critical voices raised in regards to gauging performance via traditional financial measures. These critics argue that firms should solely focus on operating measures and that the financial numbers will take care of themselves if operations are executed soundly. However, the authors consider the financial perspective to be important because of two reasons. Firstly, well designed financial measures can amplify quality and secondly because correlation
between operational improvements and financial boosts are thin and volatile (Kaplan and Norton, 1992).

The balanced scorecard uses financial performance measures as tools to display results of taken actions. In addition, the model also uses operational non-financial performance measures to assess drivers of future financial performance.

The purpose of streams of information from several directions in combination with a limited set of measures is to guard against information overflow, sub-optimisation and to keep the focus at the most crucial aspects of business.

The balanced scorecard is the most cited piece of work in the field of performance management. At the time of introduction the scorecard was considered revolutionary to the field due to its innovative multi-dimensional approach to performance measurement. According to Rigby (2001) between 30 and 60 per cent of companies has adopted the framework.

Even though the balanced scorecard is considered to be the most famous and popular framework it has disadvantages. Ghalayini et al. (1997) argues that the weakness of the scorecard is that it is conceptualized as a tool of controlling for senior managers and not as
an improvement tool for factory operation levels. Another weakness is the inadequate instructions on how proper measures can be identified and initiated. Finally the concept lacks a competitor perspective.

Since firms started to implement the balanced scorecard, investigations has empirically concluded that the impact of enhancement related to performance of the framework have supplied mixed results (Banker et al., 2000) (Neely et al, (2004) cited in Neely, 2005). Due to the freshness of the concept investigations in regards to the effect of the balanced scorecard in practice has not been possible earlier. Brignall (2002) argues that the linear and static nature of the tools for designing and implementing score cards, strategy maps, is the problem. Strategy maps assume rationality between factors of organizational performance when, in reality, those relationships are recursive and irrational. Studies in the Canadian manufacturing industry indicate that even though firms adopt the balanced scorecard they have not been able to adopt non-financial measures to higher degree than firms using traditional performance management approaches. (Gosselin, 2005).

3.5.5 THE PERFORMANCE PRISM

The performance prism is a framework designed to assist performance measurement selection – the vital process of picking the right measures. It suggests that the performance measurement system should be focused around five distinct but linked perspectives, illustrated in Figure 10;

- Shareholder satisfaction – Who are the important stakeholders and what do they want and need?
- Strategies – What are the strategies we require to ensure the wants and needs of our stakeholders are satisfied?
- Processes – What are the processes we have to put in place in order to allow our strategies to be delivered?
- Capabilities – What are the capabilities we require to operate our processes?
- Stakeholder contributions - What do we want and need from stakeholders to maintain and develop those capabilities?
Stakeholder satisfaction is seen as the first facet. Instead of deriving measures from strategy, the framework argues that a strategy is a plan for delivering value to a set of stakeholders and hence measures need to be directly derived from the wants and needs of the stakeholders. When the wants and needs are mapped out, the second facet starts: the exploration of what strategies to put in place to ensure their satisfaction (Neely et al., 2001).

The third facet of the framework is the processes. The common generic business processes needed in order for organizations to follow and fulfil strategies are enlightened. These are: develop new products and services, generate demand, fulfil demand and finally plan and manage enterprise. Specific measures within each process should be identified and generated in order to allow managers to track performance. The fourth facet is capabilities; they are defined as the combination of people, practices, technology and infrastructure that together allow execution of business processes. The last facet of the performance prism is stakeholder contribution. The authors argue that organizations and stakeholders enter a relationship with mutual demands. Just as the first facet lists the wants and needs of the stakeholders, the last facet addresses the wants and demands of the organisation towards the stakeholders (Neely et al., 2001).

The framework is unique with the broad focus on stakeholders. The strength of the prism is that it questions before selecting and hence ensuring that solid measures are generated.
3.5.6 The Performance Pyramid

Cross and Lynch (1992) framework “the performance pyramid” puts corporate vision in focus. It is considered one of the earliest approaches to advocate integrated measurement systems. The framework addresses internal and external effectiveness and links corporate strategy with daily operations through a pyramid consisting of four levels, illustrated in figure 11:

- Corporate vision – The “heart and soul” of the company defines its markets and how to compete: on price, breadth of product line and quality of sales force. The strategy is translated into business unit objectives.

- Business Units – Comprises key results, objectives and measures. Most business units define success as reaching short-term goals of cash flow and profitability and long-term goals of growth and market position.

- Business Operating Systems – Bridges the gap between top-level, traditional indicators and new day-to-day operational measures.

![Figure 11. The Performance Pyramid (Cross & Lynch, 1992).](image-url)
• Key Performance Measures – Integrated and balanced set of performance measures that are controllable on daily basis for managers and workers alike. Measures consist of; quality, delivery, cycle time and waste.

The Performance pyramid focuses on the paramount requirement of a performance measurement system, a clear link between performance measures at different hierarchical levels within a company so that goals are aligned. The pyramid links corporate strategy to operations by translating objectives top down and measuring bottom up (Cross and Lynch, 1992).

Continuous improvement is discussed but no implicit process exists for implementation. The authors suggest that continuous improvement is triggered by the state of improvement of the competitors and that their achievements should be a point of reference for what the company must overachieve. For example, a goal of 95 per cent delivery precision says nothing without knowing where the competition is heading.

Ghalayini et al. (1997) argues that the main strength of the concept is the integration of corporate objectives with operational performance indicators. Further, the vertical and horizontal alignment of strategies is another strength that ensures correct direction. However, the concept lacks a mechanism for identifying key indicators of performance. Further, the lack of a process for continuous improvement is also seen as a disadvantage.

3.5.7 Medori and Steeple’s Framework

The Medori and Steeple’s framework is based on a research programme executed at four medium- to large-sized manufacturing organisations. The purpose of the research programme was to identify actual industry requirements for a performance measurement framework (Medori and Steeple, 2000).

The concept is designed to either audit or enhance an existing performance measurement system or to create a brand new one. The framework is designed as a process consisting of six detailed stages, illustrated in figure 12:
1. Defining manufacturing strategy and success factors
2. Matching strategic requirements with the six defined competitive factors
3. Selection of the most suitable measures
4. Auditing existing measurement systems to identify which existing measures are to be kept
5. Implementation of measures based on eight elements
6. Periodic review of the measurement system

Figure 12. Medori and Steeple’s Framework (Medori & Steeple, 2000).

The starting point is to define the manufacturing strategy. The purpose of the step is to ensure that measurements are related to the company’s strategy. The second stage matches the requirements derived from the strategies to six competitive priorities: quality, cost, flexibility, time, delivery and future growth. Once stage 2 is completed the competitive priorities become clear in the area of measurement for the company. After identifying priorities the most suitable measures are chosen out of a spectrum of 105 well defined measures in stage three. The fourth stage is to audit the existing performance measurement system. The measures of the existing system are compared with the ones picked in stage three. Old measures that are aligned with the new ones are kept, the rest are scrapped. Stage five is essential and contains the implementation of the measures linked to eight elements: title, objective, benchmark, equation, frequency, data source, responsibility, improvement. Finally, the last stage of the framework is revolved
around periodic maintenance of the system. Periodical reviews are a part of the framework and serve as a guard against redundancy and obsolescence (Medori and Steeple, 2000).

3.6 CRITICAL ASPECTS FOR DYNAMIC PERFORMANCE MEASUREMENT SYSTEMS

In recent years considerable attention has been given on the design and use of performance measurement systems. As global competition increases and ownership and management has increasingly been separated, financial measures on return of investment have been applied for expanding range of applications, in order to facilitate a monitoring of management and execution from executive levels and owners.

However, as Kennerley and Neely (2003) point out, there is wide documentation on the deficiencies in traditional financial performance measures and their insufficiency for the effective management of businesses in today’s rapidly changing and highly competitive markets:

“Authors suggest that traditional financial performance measures are historical in nature (Dixon et al., 1990); provide little indication of future performance; encourage short termism (Hayes and Abernathy, 1980; Kaplan, 1986); are internally rather than externally focused, with little regard for competitors or customers (Kaplan and Norton, 1992; Neely et al., 1995); lack strategic focus (Skinner, 1974); and often inhibit innovation (Richardson and Gordon, 1980).”

These drawbacks of traditional measures have been especially visible during the latest year of financial crisis and rapid decline in orders, especially for the automotive sector. In addition, in an increasingly complex performance measurement context, the management of performance systems and performance indicators is increasingly important.

Companies often fail to continuously reflect the dynamic business environment and their new priorities in their performance measurement systems. With this background, Neely (2005) points out five key research issues for performance measurement:
• How to design and develop enterprise performance management rather than measurement systems?
• How to measure performance across supply chains and networks rather than within organisations?
• How to measure intangible as well as tangible assets for external disclosure as well as internal management?
• How to develop dynamic rather than static measurement systems?
• How to enhance the flexibility of measurement systems so they can cope with organisational changes?

This report has vowed to search deeper into the two latter issues raised above: How to develop a dynamic and flexible measurement system and what the critical aspects of such system are. Through extensive search of literature in the field of performance measurement and performance management three critical aspects for a dynamic and flexible system have been identified: Ongoing management, Evolution and Alignment. How measurement systems evolve after implementation is a question that few researchers have tried to answer (Waggoner et al., 1999). Each of the critical aspects for a viable system are discussed more in depth below.

3.6.1 ONGOING MANAGEMENT

As it is generally accepted both in academia and practice that business strategy is dynamic and ever changing in nature; a consensus is growing that performance measurement systems must be accounted for when direction changes (Najmi, Rigas and Fan, 2005). In a historical analysis made by Barnes and Radnor (2007) the authors conclude that the management of performance measures has deepened and is now linking the operational parts to the strategic management process. A more holistic approach is being recognized where alignment throughout the organization is emphasised. In addition, Gregory (1993) reason that none of the existing measurement systems emphasises the need for a management process, nurturing the measurement system and keeping it viable. Instead the management is seen as a once-off initial occurrence.
Salloum and Wiktorsson (2009) argue that a management process is paramount in order to create a dynamic and flexible measurement system. As sound measures are derived from either corporate strategies or stakeholder interests a reactive and efficient performance management process linking strategic objectives to measures is of essence. A reactive performance management process will anticipate contextual change and trigger rapid change throughout an organization as strategy differs. An efficient performance management process will create a measurement system that is robust to irrelevant disturbances and simultaneously sensitive to relevant changes (Salloum & Wiktorsson, 2009).

However, few organizations appear to systematically manage their measurement systems over time. This creates a paradox with organizations using metrics that are deemed obsolete or redundant due to the unfamiliarity of changing them (Waggoner et al., 1999). If the ongoing management is not functional the cascading of top measures will be biased and misleading measures at middle and lower levels will be generated. In organisations that appreciates and values results this is risk of magnitude (Salloum & Wiktorsson, 2009).

It is of utmost importance that the development and management of a performance measurement system is not seen as a once-off happening but as an on-going event. Niven (2006) argues that a measurement system must be responsive to differentiated conditions internally and externally and therefore needs to be a progressive process. In order to secure that ideal results are achieved a performance measurement system needs to be designed, managed and evaluated in periodic fashion (Waggoner et al., 1999).

3.6.2 EVOLUTION

According to Kennerley & Neely (2003)

“The design and use of performance measurement systems has received considerable attention in recent years. Many organisations have redesigned their measurement systems to ensure that they reflect their current environment and strategies. However, increasingly the environment in which organisations compete is dynamic and rapidly changing, requiring constant modification of strategies and operations to reflect these
changing circumstances. Despite this, few organisations appear to have systematic processes in place to ensure that their performance measurement systems continue to reflect their environment and strategies”.

It is evident in both business and academia that there is a need for a mechanism that reviews performance measurement systems due to the constantly changing modern markets (Najmi, Rigas and Fan, 2005). Eccles (1991) pointed out that an evolutionary process within measurement systems is non-existent. However, a performance measurement system is of no use if it is not capable of adjust to contextual change (Waggoner et al., 1999).

Gregory (1993) argues that the need for a dynamic approach within measurement systems is not generally addressed. Ghalayini and Noble (1996) also inquires a dynamic system that is able to cope with updating measures and measurement standards. Eccles (1991) concluded a non-existence of a predetermined process for changing measurement systems is clear.

Kennerley and Neely (2003) suggest that the evolution of a system is possible through execution of three phases: Reflection, modification and deployment:

• Reflection on the existing performance measurement system to identify where it is no longer appropriate and where enhancements need to be made.
• Modification of the performance measurement system to ensure alignment to the organisation’s new circumstances.
• Deployment of the modified performance measurement system so that it can be used to manage the performance of the organisation.

3.6.3 ALIGNMENT

Monitoring indistinguishable metrics do not impact individuals will exacerbate the feeling that performance measures are not to work with, but only to report (Cokins, 2004). Employees need to able to directly affect monitored measures and control the outcomes. If this emphasis is reached then the higher focus will be generated towards finding the appropriate measures. In order to reach alignment the start off point
needs to be a well-articulated strategic objectives and underlying hypothesis. Further, both objectives and hypothesis need to be cascaded to operational levels to create alignment. This process is called in popular terminology for the “cascading process” and is extremely difficult to implement effectively (Viane and Willems, 2007).

It is recognized in literature that performance measurement systems need to achieve alignment with strategic priorities. (Kaplan and Norton, 1993; Neely et al., 1995). Also, it is widely established that the external and internal environment of organisations are in constant change (Bititci et al., 2000). The link between measure system and strategy is powerful if achieved. Creating alignment between the two components will provide information on whether the strategy is being implemented and encourage behaviours consistent with it (Neely, 1999). Further, a successful cascading of measures will maintain a common focus on strategy throughout the organization (Cokins, 2004).

In an analysis based on the common characteristics of performance measurement systems in the literature, Taticchi and Balachandran (2008) lists communication/alignment as one of the most common features of measurement systems. However, in the same article the authors argue that performance measurement systems need guidelines to effectively communicate measures internally within the organization to create goal alignment. Several tools are proposed such as single indicators, dashboards, icons and smiles with employees. Cokins (2004) assert it is of paramount importance that Key Performance Indicators (KPI) is associated with actions plans.

The first research question imposed in the methodological chapter made an inquiry for critical factors of dynamic measurement systems. The answer is On-going management, Evolution and Alignment.

3.6.5 PRE REQUISITES

In order to enable an evolutionary performance measurement system a set of enabling factors need to be in place. The existence of the enabling factors in combination with active use of the performance measurement system is a pre-requisite for the possibility of an evolving system (Kennerley and Neely, 2003). The enabling factors are defined by Kennerley and Neely (2003) as:
• Process – existence of a process for reviewing, modifying and deploying measures.

• People – the availability of the required skills to use, reflect on, modify and deploy measures.

• Systems – the availability of flexible systems that enable the collection, analysis and reporting of appropriate data.

• Culture – the existence of a measurement culture within the organisation ensuring that the value of measurement, and importance of maintaining relevant and appropriate measures, is appreciated.
EMPIRICAL STUDIES

With the methodological and theoretical frameworks presented earlier in this report, time has come to introduce the empirical approach chosen by the author. Three research questions were posed in relation to the subject of performance management and measurement systems in the methodological chapter. The first was covered in the theoretical framework in chapter 3. Research question two and three will be answered through a cross-case analysis of two extensive case studies presented in this chapter.

4.1 CASE COMPANY A

The first company is located in the region of Mälardalen in Sweden and produces and assembles components for the heavy automotive sector.

4.1.1 CASE STUDY OBJECTIVE

The objective with case A was primary to investigate to what degree the critical aspects of viable measurement systems exist in practice. Further, the case study was designed so it would enable comparison to other cases made in this report and in the future.
4.1.2 METHODOLOGY

As mentioned earlier, a data collection protocol with two components was designed: analysis of archived data and interviews. The financial data base and operational manual data base were scrutinized in order to create an accurate picture of what the current situation looks like. The whole process from the mission of the company to the performance measures at lowest operational level were mapped out in the operational manual.

After the mapping of the data bases the interview study were initiated. The nine members of the executive management board at the site (respondent A1-A9) were invited to separate interviews that took between 40-60 minutes each to execute and where held at random conference rooms at the manufacturing site. All interviews were recorded and transcribed.

In addition to the board members, two persons (respondent A10-A11) deemed to have special insight into the phenomenon in question, were summoned for interviews. However, it should be mentioned that the interviews with the two persons never additional added in to final interview summary even though their information was useful. The first interviewee described how the performance measurement structure looked like before a widespread organizational restructuring occurred. The second interviewee belonged to an external management team and the emphasis of the session concentrated on the tools that his team had implemented in order to align and cascade goals. Due to the narrow focus of the sessions they were expelled from the overall interview results.

The primary interview questions mounted up to 36 questions per session divided into three parts. 11 in the open part, 15 in the semi structured part and 10 in the questionnaire. Additional follow up questions differed depending on the descriptions made in the open part.

4.1.3 RESULTS

In order to make the result sensible for report readers a matrix has been constructed as illustrated in figure 13. The function of the matrix is to
give a quick but comprehensive look at the interview results of case company A. The scale used in the matrix stretches from 1 to 5. The interview results were homogenous on some points while diverse on others. Questions touching the way of working and processes of the top managerial body generated homogenous answers. However, questions focusing on the capabilities and conditions of each function produced diversified results.

Figure 13. Result matrix – Case company A.

1- Inadequate resources
2- Resources exist but more is needed
3- Resources are emerging
4- Resources are on a high level
5- Resources has reached a level of excellence

4.1.4 DISCUSSION

The low scores produced for the critical aspects of a dynamic and flexible measurement system is a result of the lack of supportive processes and mechanisms. Half of the enablers discussed by
Kennerley & Neely (2003) produced low scores. Furthermore, the responses producing low score results by the interviewees often asserted that it was due to the lack of standardized routines and processes. One reason for this can be that the financial department as process owners do not have the means to dedicate resources for putting a robust process together.

The single factor with strong ratings was the evolitional capabilities of the system. The amplified ratings were much thanks to the existence of the tool labelled as the result plan.

In order to create the culture of result orientation the managerial body involved an external management consulting team with the purpose to implement tools that would enhance result culture throughout the organisation.

The external team implemented the result plan. The purpose of the result plan as a tool is to enhance result culture and ensure that goals and objectives are met within an organisation. It is designed to follow up organisational and departmental goals and individual tasks and objectives. In order to assure alignment, result plans are synchronized vertically throughout the hierarchy (Figure 14). The idea is to ensure fulfilment of overall goals through a process of weekly follow up of the individual tasks and objectives. The weekly follow up-process is executed by result meetings throughout the organizations managerial bodies. During the result meetings status and progress is reported and deviations to plan are scrutinized.

The result plans are seen as a vital part of the way of working at case company A and the follow-up meetings are considered being of high importance. The acceptance of the result plans has pushed the integration of performance measures. The implementations of performance measures have become a part of the day to-day operations since every head of function and cell have their own set of metrics to report. Just as figure 14 illustrates, in addition to goals, performance measures are vertically aligned to respective function and cell. Further, the same procedure of follow measures, status is reported and deviations scrutinized on a weekly basis.
Even though the result plan is enhancing the evolution of measures there is one factor affecting the result plan. No mechanism or auditing routine exists with the purpose of making sure that alignment is reached. The non-existence makes the effectiveness of the tool contextual and dependant on the person using it.

Almost all respondents knew how many overall performance measures the company had deployed. Coming to the alignment of strategy to performance measures and the link further down to the lowest operating level the perceptions are ambivalent. Time dedicated to breaking down strategy to measures exist but are organized ad-hoc. One respondent argued that the measures deployed are generic for a manufacturing site and that they will not be vastly altered as strategy deviates. The respondent further developed his argument by adding that irrelevant of strategic objectives, measures at manufacturing sites often evolve around producing the right amount of units, at the right time with the right quality using as little resources as possible. Another respondent did not perceive measures as derivations from strategy but
from focus areas and values. He asserted that as strategies change often, measures will lose their long-term effects if changed as often.

When analyzing the results of the on-going management several flaws became distinct. First the lack of documentation makes the routines uncertain. The effect of uncertainty amplifies, the further down the hierarchy it goes. Another respondent explicitly said that no way of working exist that makes the way of working structured. Further, the lack of a procedure of setting definitions has caused blurriness both within the top managerial body and further down the organization. Respondent A7 asserted that due to lack of standardized way of defining, measures are generated differently from case to case. Furthermore, the implicit line between the onus of the financial department as process owners and the responsibilities of the functions as owners of the measures makes decision-making an effortful procedure. However, the use of the *result plans* has initiated an embryo to a stable process.

The only performance management factor that stands out is the *evolution* of measurement systems. The mechanisms of reflection, modification and deployment discussed by Kennerley & Neely (2003) enabling the evolution of a measurement system is present. The respondents reached consensus in the argument that the *result plan* as tool and the way of working that comes with it enables the user to reflect, modify and deploy on quarterly basis. However, one respondent made explicit that even though the tool and a way of working exist nothing is documented in the operational manual. Another respondent argued that the result plan process works best at top levels. The respondent further developed the argument by asserting that efficiency of the process at lower levels is a question of maturity and culture. The most striking response came from respondent A3 that argued that in order to achieve long-term continuity KPI’s sometimes should not be replaced even though strategy alters.

Cascading of measures did attract diverse opinions of the respondents. From chapter 3 we can recall that it is widely recognized that performance measures need to achieve alignment with strategic priorities. (Kaplan and Norton, 1993; Neely et al., 1995). Further, a successful cascading of measures will maintain a common focus on strategy throughout the organization (Cokins, 2004). Once again, the result plan plays a paramount role as the tool of cascading.
Respondents argued that the result plan structure with daily meetings and result plans for teams and individuals have pushed alignment. However, the same respondents were not able to answer if the links between measures are clear vertically throughout the organization. Another respondent asserted that the lack of a structured way of working and the magnitude of frameworks available at the site touching the same area made the link blurry and not always easy to distinguish. The respondent developed the statement by explaining that several frameworks diverted focus from each other even though they were all interlinked. This paradox made it difficult to create a clear perception on what to prioritize; the missing peace is something or someone holding and integrating the frameworks together under one label.

4.2 CASE COMPANY B

Case company B is located in south east Asia and belongs to the same company as company A. Case company B processes, manufactures and assembles heavy constructional machines.

4.2.1 CASE STUDY OBJECTIVE

The objective with case B was primary to investigate to what degree the critical aspects of viable measurement systems exist in practice. Further, the case study was designed so it would enable comparison to other cases made in this report and in the future.

4.2.2 METHODOLOGY

In order to enable the two cases to be eligible for a cross-case study the same data collection protocol with dual components were used in this case as well: analysis of archived data and interviews.

Five days were given at the manufacturing site to execute the case study. In order to manage the amount of time as efficiently as possible a vast amount of information regarding the purpose of my visit and the all-embracing project surrounding this report were sent months before my departure. A clear agenda for the case study was agreed two weeks before departure. Due to the fact that the visit came in during the year-
end preparations the analysis of archived data were pushed to the last
days of the case study in contrast to the early stage analysis in case
study A.

Seven members of the executive production management board at the
site (repondent B1-B7) were invited to separate interviews that took
between 50-70 minutes each to execute and were held at a designated
conference room at the manufacturing site. Due to the low familiarity
with the departments and way of working at case company B every
interview were initiated with a presentation made by the interviewee
introducing their department and way of working.

The primary interview questions mounted up to 36 questions per
session divided into three parts. 11 in the open part, 15 in the semi
structured part and 10 in the questionnaire. Follow up questions
differed depending on the descriptions made in the open part. All
interviews were recorded and transcribed.

The financial data base and operational manual data base were
scrutinized in order to create an accurate picture of what the current
situation looks like. As in case A, the whole process from the mission
of the company to the performance measures at lowest operational
level were mapped out in the operational manual.

4.2.3 RESULTS

An identical interview matrix as in case A was constructed and the
same scale of points was applied:

1- Inadequate resources
2- Resources exist but more is needed
3- Resources are emerging
4- Resources are on a high level
5- Resources has reached a level of excellence
4.2.4 DISCUSSION

The interview results were homogenous almost throughout the interview study. The factor producing the widest diversity of answers was Culture. However, here a clear correlation could be found between answer and age of respondent.

The most contributing factor to why case company B produced such solid scores is history. Due to its proximity to Japan and Toyota, case company B, at the time locally owned, started to implement lean production principles at the end of the 80s. In contrast, case company A made a factory transformation throughout the years of 2007-2009 in order to implement the company group specific production philosophy based on lean principles. With other words, Case company B have had almost two decade advantage in integrating lean principles into the company culture.

All respondents in the interview study were aware of the overall performance measures used by case company B. The company aligns strategic objectives with performance measures through an annual business plan. According to respondent B4 the business plan process sets the targets for key performance indicators and cascades them through the channels of KPI owners, functions and team levels. Results

<table>
<thead>
<tr>
<th>Performance management factors</th>
<th>1</th>
<th>2</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Alignment of strategy and KPI</td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>On-time delivery</td>
<td>X</td>
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<tr>
<td>Evolution of measurement systems</td>
<td>X</td>
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<tr>
<td>Cascading of measures</td>
<td></td>
<td>X</td>
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<td>Process focus</td>
<td>X</td>
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<td>Standardized routines</td>
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<td>X</td>
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<tr>
<td>Information systems</td>
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<tr>
<td>Ownership</td>
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<td></td>
<td>X</td>
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<tr>
<td>Culture</td>
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<td></td>
<td></td>
<td>X</td>
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<tr>
<td>Human competence</td>
<td>X</td>
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<tr>
<td>Quality of data</td>
<td></td>
<td>X</td>
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Figure 15. Result matrix – Case company B.
produced indicate that a strong link between strategies and key performance indicators exist. However, respondent B7 asserted that even though the link between strategy and KPI is clear, focus can swiftly shift due to change in business environment. Furthermore the respondent developed the argument by arguing that the swift change in business will quickly be recognized by the change of performance indicators that support the key performance indicators.

Case company B do have a clear performance management process. The company has a function that focuses solely on process development and has a clear ownership of the performance management process. Respondent B1 claimed that the on-going management as routine need to become standardized in documentation and routines. The focus of the performance management process is the cascading of measures and not the on-going management according to respondent. Within the same function lies the information system responsibility of the site and that has generated a synergy in the ongoing updating of the information systems related to the measurement system.

Striking similarities were found when analyzing the result under the evolution of the performance system factor and theory. The mechanisms discussed by Kennerley & Neely (2003) are available within the daily operations of the performance measures at the site according to all respondents. The evolutionary factors are integrated to the business plan review that is held quarterly.

As discussed in the frame of reference, it is widely recognized that performance measures need to achieve alignment with strategic priorities. (Kaplan and Norton, 1993; Neely et al., 1995). Further, a successful cascading of measures will maintain a common focus on strategy throughout the organization (Cokins, 2004). The cascading of measures is initiated through the roll out of the annual business plan. Strategic objectives are broken down to performance measures that are in turn cascaded down to measures at team levels. The measures are then followed up through daily, weekly and monthly follow up meetings. Respondents reached consensus regarding the existence of a clear link throughout the cascade of performance measures to lowest cell-level.
A clear process focus exists within the organization it has created a clear perception of ownership and where it is located. However, interview results witness that the on-going management activities need support from a standardized way of working.

The performance management factor producing the highest rating is the information system. Case company B has an information system framework that covers production, finance, sourcing and maintenance. The system is highly flexible and has eliminated manual handling of data. This has proven to be of paramount importance for the quality of data. No respondent has ever doubted the data in the key performance indicators indicating that the system is highly reliable and can easily be customized according the needs of the company.

4.3 CROSS-CASE ANALYSIS

In the discussions above one can conclude that both companies do have their respective strengths and weaknesses also illustrated in figure 16. Going through the critical factors for dynamic and flexible systems one can conclude that Case Company B (CCB) has a solid platform for aligning strategy to KPI through the business plan. Key performance indicator goals are set in relation to the strategic objectives and are cascaded down to lowest departmental levels. In contrast, Case Company A (CCA) does not follow a documented process dealing with the strategic breakdown, still the link between strategy and KPI exist. However, the strength and clarity of the link is perceived differently from one respondent to another at CCA. The lack of standardized way of working at CCA has without doubt damaged clarity and amplified blurriness.

Coming to the on-going management of the measurement system both case companies displayed multiple flaws. CCA displayed flaws in standardized routines and a documented process. These non-existences created uncertainty that spread throughout the organization. However, the result plan has helped CCA to initiate an embryo of an on-going management process. The result plans have enabled measures to be reflected upon at quarterly basis. However, it is a question of maturity to integrate the phases of modification and deployment to the quarterly meetings. CCA has a dubious cut-off point between process ownership
and measurement ownership creating delayed and at times confusing decision-making. In contrast, CCB has been able to create a documented performance management process. The process makes the ownership clear, the respondents however fail to refer to how the ongoing management is executed.

Through the use of the result plan structure CCA has created an efficient tool to handle the factors enabling measurement systems to evolve. The respondents reached consensus in the argument that the result plan as tool and the way of working that comes with it enables the user to reflect, modify and deploy on quarterly basis. However, respondents made it implicit that the result plan works best on highest managerial level. Further, one respondent made the claim that evolution sometimes is disregarded in order to obtain continuity. In contrast, CCB have integrated the evolutionary aspects in the business plan reviews. However, the result plan has the advantage due to the fact that they are used on a weekly basis.

<table>
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<th>Cross-Case Analysis</th>
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<tbody>
<tr>
<td>Performance management factors</td>
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<td>Alignment of strategy and KPI</td>
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<td>Human competence</td>
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<td>Quality of data</td>
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X : Case Company A
X : Case Company B

Figure 16. Cross-case result matrix.

The advantages of the process focus framework that CCB has applied became apparent. Except the evolutionary factors CCB has covered the critical factors through a clear process with distinct ownership. However, one respondent asserted the need for a higher level of
documentation of routines. The non-existence of CCA’s process consequently produced low scores in the interview study. CCA respondents asserted that the lack of standardized routines and processes disabled them from pursuing a structured way of working. One of the underlying causes is that the financial department as process owners do not have the means to dedicate resources for putting together and maintaining a robust process. Further, the quality of the information system data produced is higher at CCB than CCA. The driving factor behind is the integrated system solution used by CCB. CCA uses multiple information systems with various purposes and hence require comprehensive manual impositions in order to unite data. CCA respondents asserted that even though the systems are not flexible sometimes it comes down to what the competence the employees possess.

The company culture of CCB is heavily influenced by the national culture of the south east Asian country where it is located. Further influences were caught from the development of Japanese manufacturers in the end of the 80s. This has given CCB a clear advantage in obtaining the culture visualised by the company group. Within the company group culture goal orientation is central and key performance indicators are viewed as something to work with and not only to report. CCA started their pursuit of a strong goal oriented company culture in 2007 when a large scale project with the purpose of transforming the site after the company production philosophy was rolled out. It should be noted however that the focus on goal orientation that CCA has had through the consultation of the external management team has had an important effect.

When reflecting on the capabilities of both companies I can not help to become ambivalent. The main strengths of CCB are the process focus and the highly developed information systems. The business plan has been developed to an efficient cascading tool and road map that is central for their way of working. CCA on the other hand has its main strength in the result plan. The result plan has enabled the company to cascade goals and to create personal involvement in tasks and objectives. Consensus is reached among respondents that the result plan has enhanced result culture to another dimension. Further, the evolutionary capabilities have also been integrated in the result plan way of working in an efficient manner. The major issues for CCA are
the lack of processes and standardized way of working, the loophole in the result plan structure and the information systems that need to be integrated in order to create flexibility and higher quality of data. As some CCA respondents have asserted, the data in the KPI’s are not always reliable.

As discussed in the frame of reference, in order to create a dynamic and flexible measurement system three critical factors need to be satisfied; on-going management, evolution and alignment. Further, besides the critical factors several pre-requisites need to be in place in order to enable an evolution of a measurement system. The existence of the enabling factors in combination with active use of the performance measurement system is a pre-requisite for the possibility of creating an evolving measurement system (Kennerley and Neely, 2003). The pre-requisites are; process, systems, people and culture. Both case companies do fulfill the pre-requisites.

Analysing the empirical results, CCA have produced higher scores on the three critical aspects identified in theory; alignment of strategy and KPI, on-going management and evolution of measurement systems in the cross-case matrix. However, looking at the consolidated result of the whole analysis in figure 16 CCB generates higher scores.

The lack of process is inhibiting the CCA to evolve in a structured manner. The result plan plays a vital role in nurturing the critical factors. Further, the static information systems make flexibility troublesome to obtain for the company. In contrast, the process focus of CCB has generated a structured way of working. The business plan ensures alignment from strategic objectives to KPI’s at lowest departmental levels. CCA respondents highlighted the fact that a business plan is missing and would have provided assistance as a roadmap. From the critical factors on-going management was the hardest to distinguish in the empirical studies. Having a process owner that claims ownership for the performance management process is not a guarantee for on-going management. This is illustrated by the fact that the financial department owns the process as CCA but do not have the resources to dedicate for the reactive on-going management of the measurement system.
4.4 RECOMMENDATION

The case studies were highly instructive due to the clear contrasts they brought to the surface. Both companies displayed strengths and weaknesses, none however produced adequate results on all critical factors. Achilles’ heel for CCA is primarily the lack of process and secondary the static information systems. A majority of the shortcomings of CCA are directly derived from the non-existence of a defined process. The recommendation below concerns CCA.

4.4.1 ON-GOING MANAGEMENT

It is of utmost importance to note that on-going management comes down to responsibility and attention. The problem that both theory and empirics highlight is that companies initiate measurement systems with once-off management. After the roll out of the measurement systems no resources have been available to claim responsibility and ensure that the measurement system evolves. This is the root of the problem and the solution is simple. It is enough to make the on-going management the responsibility of one employee and make sure that adequate amount time is available to proactively manage the system.

The financial department at case company A as answerable owner to KPI related questions does not have the means to proactively initiate continuous improvement and maintenance, instead the actions have become side-lines. Resources need to be available in regards to primary shaping and secondary maintaining a standardized structure of way of working with related documentation in regards to the on-going management of the measurement system.

The responsible part needs to create a web page on the intranet and make it the performance measurement hub of the company. The hub needs to contain the aggregated measures and all other necessary and relevant information and documentation. The web page needs to be visible for everyone due to its purpose as a communication tool. Furthermore, the process owner should report to the managerial body once a month in order to keep track of the contextual changes occurring. I recommend that the responsibility is not removed from the financial department due to their access to information but that resources are made available so that time can be spent on proactively
maintaining the measurement system. Finally, the abolishment and integration of the different frameworks in the organisation lies within the scope of the on-going management.

4.4.2 ALIGNMENT

The result plan plays a central role in creating alignment throughout the organization. The result plan is central to how the executive management board steers the organization. The efforts put into integrating the tool to the ordinary way of working has created appreciation and made the tool popular amongst peers. However, the result plan structure does not have a formal process description in the operational manual. Further, the current informal structure needs to be overlooked due to its loophole in horizontal alignment of plans. The high dependency on certain individuals needs to be abolished through remaking the process so that alignment can be visualised. I would recommend the integration of the result plans into the intranet page discussed above. The purpose of this would be to patch the loophole by making the cascade of goals visual for the organization. Responsibility becomes more clearcut and blocks the dependency on individuals.

Empirics show that the information systems are inhibiting flexibility and higher data quality. Some KPI’s on aggregated levels can not be cascaded down due to the static character of the information systems. CCA needs to aim at an integrated information system with the same qualities as the one administred by CCB. The company needs to update the information systems in order to allow flexibility without emphasising manual impositions.

CCA respondents reached consensus coming to the untrustworthy quality of data in the KPI’s due to the static nature of the information systems. In order to bolster a culture where KPI’s are tools of governance and not a form of reporting KPI, in-data needs to be reliable and trustworthy.

4.4.3 EVOLUTION

The evolutionary aspects covered in the frame of reference and tested in the empirical chapter are the strengths of CCA. However, a link needs to be created to the strategic process and the goals and objectives
generated from it. When reflecting on the appropriateness of KPI’s, a reflection on the appropriateness of the strategic objectives and the hypothesis that strategy is built upon is inevitable. However, no clear link exists to re-loop the feedback. Further, culture needs to be improved through education in order not to cripple evolution. In the case analysis several respondents made it implicit that culture and maturity are inhibiting evolution.

Once again, the result plans play a role. The quarterly and yearly evaluation meetings are partly used to reflect upon the appropriateness of measures. However, due to the blurry link to the strategic process, strategic objectives cannot be questioned in the proper forum. The loophole in alignment disturbs the re-loop of feedback towards strategic objectives generated through the mechanisms of evolution.

4.4.4. PERFORMANCE MANAGEMENT PROCESS

From the observations and empirics much attention have been paid towards how to grasp and maintain the evolutionary factors. We can recall from the definitions that performance measurement systems are defined as the set of metrics used to quantify efficiency and effectiveness of taken actions (Neely et al., 1995). The definition implicitly excludes the supportive tools, methodologies and supportive technologies. Hence, the critical factors discussed in this report are not to be integrated under the term performance measurement system as defined. Performance management however, is defined as the process of managing strategy through business improvement methodologies and supported technology (Cokins, 2004). The critical factors are not to be a part of the measurement system but in its supportive environment.

As figure 17 indicates it can be illustrated as a matrix synchronizing the strategic process to the budget process providing objective alignment and a reloop of feedback back to the top management board. The on-going management and the revolving evolutionary spin secures that the performance measurement system evolves as strategy alters.

I however, would like to perceive it as a process just as illustrated in figure 18. The first step is to obtain alignment between strategic objectives and KPI’s. The alignment will secure the link between the strategic and budget processes as illustrated in figure 17. Further,
alignment will safeguard that change will be triggered throughout the organization when strategy alters.

Figure 17. Performance management matrix.

The next step is to integrate the KPI’s into the result plans in order to enable evolution. The quarterly follow-up meetings enables reflection on metrics and modification and deployment if necessary.

Step three is administrative and purposes to deal with rising issues regarding performance management at the site. Responsibility and attention are focused on external and internal issues. The intranet hub is the tool of communication and keeps track of contextual change and is kept updated.

At step four a dynamic performance measurement system is enabled. Alignment, evolution and on-going management is achieved and with it a dynamic measurement system capable of managing contextual
change. With a dynamic system in place a passage allowing a communication reloop validating strategy is created.

A performance measurement system without evolutionary capabilities is deemed worthless. As globalization has amplified the rate of change, companies compete in an environment that demands rapid change within organizations after contextual change. Strategic objectives and focal points change at a pace that requires a dynamic performance measurement system that is able to adjust and cope with internal and external change in conditions. The findings in this report recommend a supportive framework based on the critical factors of on-going management, alignment and evolution as means of enabling a dynamic performance measurement system.
CONCLUSIONS AND FUTURE WORK

The fifth and last chapter highlights the conclusions made in the theoretical and empirical research. Furthermore, the research questions are repeated and answered. Finally, the contributions made and the agenda for future work is presented.

5.1 CONCLUSION

The objectives imposed on this research were to find the critical aspects for dynamic performance measurement. The theoretical chapter was established for dual purposes. The first is to give the reader a comprehensive understanding of what has been done in the field of performance measurement and management so far and the second to answer the first research question:

RQ1 – what are the critical factors of a dynamic performance management system?

Based upon the frame of reference three critical factors were identified for dynamic performance measurement systems: on-going management, alignment and evolution.

The empirical chapter applied the academic findings from research question 1 in contextually appropriate milieus through two extensive case studies. The case studies tested to what extents the factors exist in practice and where improvements are needed. The empirical chapter generated answers for the two remaining research questions.
RQ2 – What specific improvements of the critical aspects are needed at Volvo CE Operations Eskilstuna?

The on-going management needs to be established by making resources available for it. Further, the result plan process needs to be formalised and the loophole in aligning the plans fixed. Finally, a clear link for the re-loop of feedback on strategic objectives needs to be established in order to obtain evolvement.

RQ3 – What is needed to implement the improvement of the critical aspects at Volvo CE Operations Eskilstuna?

In order to implement the improvement of the critical aspects a process needs to be established since they do not fit under the definition of a performance measurement system. The process depicted by figure 18 illustrates how the critical factors can be implemented. As measurement systems often are company specific, the reason to keep the process on an all-embracing level is to give companies the opportunity to embrace the factors with the methods and tools deemed appropriate for their organizations.

5.2 Future work

During the journey with this report much time has been spent on mapping out the theory within the field. The field is indeed heavy in theory and future research will be narrowed even further in order to create space for empirics. As three critical factors have been singled out, the future work will focus on how to create a generic performance management process applicable at company specific measurement systems. It is to be understood that the findings generated in this report isolated are not revolutionary, however both academia and practice has found consensus in regards to the difficulties of companies capitalising on creating viable measurement systems. This justifies the aim of the future research to focus on a generic process.
LIST OF REFERENCES


Cokins, G. (2004), Performance Management, finding the missing pieces to close the intelligence gap, John Wiley & Sons, Inc., New Jersey USA.


