

Realising dynamic abilities in a measurement system – A participatory case study

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ABSTRACT

It is generally accepted by academics and practitioners alike that production performance measures ought to be derived from the strategy of a company. However, unlike the context that measurement systems operate in, they appear to be static. Hence, companies often fail to continuously reflect the dynamic business environment and their new priorities in their performance measurement systems. In the rapidly changing environment of today the development, implementation and use of adequate performance measurement frameworks are some of the major challenges confronting organisations and are also significant success factors. The purpose of this paper is to present key contributing factors in creating dynamic abilities in a production performance measurement system. The factors are derived by a literature study, a case and by contrasting the case to the literature. The case presented is a participatory study that stretches over 10 months and follows a project leader with the task of re-designing and implementing a support structure for a production performance measurement system. Following the introduction, the paper is divided into three sections: the literature review, the case study presentation and finally a discussion regarding what factors amplify and inhibit the dynamics in the support structure of a performance measurement system. The conclusion derived is that four additional factors have emerged as enablers for a dynamic ability in the measurement systems besides those identified in the literature study.

Keywords: production performance, performance measurement systems, evolution of performance measures, dynamic measurement systems.

1. INTRODUCTION

In an ever-changing world the companies surviving are the ones who are able to successfully adapt to new market conditions. Customers, technology, suppliers and employees all place demands on the company's ability to adapt and drive evolution. It is not a matter of evolving for its own sake; it is a matter of evolving for survival and to stay competitive. The evolutionary, or dynamic, ability of the automotive industry was truly put to test during recent years, when an unforeseen downturn in demand hit many companies worldwide, followed by a fast ramp-up.

Many companies realised during these sharp turns in market conditions that they often fail to continuously reflect the dynamic business environment and their new priorities in their performance measurement systems. In the rapidly changing environment of today the development, implementation and use of adequate performance measurement frameworks are some of the major challenges confronting organisations (Santos et al., 2002). Keeping the measures relevant to changing organisational contexts is problematic and needs further research. Old and irrelevant measures are often not discarded and in combination with adding new measures the result is added confusion and cost (Paranjape et al., 2006).

The knowledge about the factors that affect the way a measurement system evolves over time are limited due to the little research that has been conducted in this part of the field (Kennerley and Neely 2003; Searcy et al., 2007). Most of the conventional approaches to performance measures are useful in daily management but less effective to the needs of strategic change. Additional studies are needed to explore this problem that will become increasingly relevant for future years (Fiorentino 2010). With this background, several prominent researchers within the field such as Neely (2005), Bourne (2008) and Ghalayini and Noble (1996) lists dynamic abilities in the measurement systems in their future research agendas.

With the need for additional research as background this paper present the re-design and implementation of a dynamic support structure for performance measurement system at a business unit of one of the leading construction equipment companies in the world. The paper follows the progress of a project for re-designing and implementing a dynamic support structure. The structure of this paper is firstly a theoretical introduction, secondly the case study presentation and finally a discussion over factors impacting on the dynamic structure of performance measurement systems.

2. THEORETICAL BACKGROUND

2.1 *In retrospect*

In the 1970s the unquestioned position of the American management style became challenged as western manufacturers were pressured by acute competition from overseas, in particular Japanese manufacturers. 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 and inadequate for how to achieve and improve performance (Kennerley and Neely, 2003; Dixon et al., 1990; Neely et al., 2005).

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. The realisation of these shortcomings in traditional performance measurement systems triggered a revolution with the purpose of replacing existing financially oriented measurement systems with balanced equivalences (Eccles 1991).

This revolution led to the genesis of measurement systems that recognised non-financial measures and endeavours balanced perspectives such as the balanced scorecard (Kaplan & Norton, 1992), the performance pyramid (Cross & Lynch, 1992) and the performance prism (Neely et al., 2001).

2.2 *Mismanagement of measurement systems*

Gregory (1993) reasons that none of the existing measurement systems emphasises the need for a management process, nurturing the measurement system and keeping it viable. Niven (2006) concurs and argues that a measurement system must be responsive to differentiated conditions internally and externally and therefore needs to be a progressive process. Instead the management is seen as a once-off initial occurrence. The argument is further developed by Salloum and Wiktorsson (2009) that argues that a management process is paramount in order to keep a measurement system up to date.

In spite of the resources consumed to replace obsolescent measurement systems with balanced ones small scale evidence exist that organisations today actively manage their systems in order to keep them contextual (Kennerley and Neely, 2003). This creates a paradox with organisations using metrics that are deemed obsolete or redundant due to the unfamiliarity of changing them (Waggoner et al., 1999). Another possible scenario is that organisations manage to create and deploy new measures but fail to remove obsolete ones and hence creating a situation with information overload.

Kennerley and Neely (2003) argues that if the failure to manage the system prevail over time another measurement crisis will be triggered with heavy resource deployment for companies in order to make them contextual again as a consequence.

2.3 *The need for performance measurement systems with dynamic abilities.*

Performance measurement systems are highly influenced by their strategic context. It is recognised in literature that performance measurement systems need to achieve alignment with strategic priorities (Kaplan and Norton, 1993). 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 organisation (Cokins, 2004).

In conclusion, strategy is in nature dynamic and ever changing due to its dependence of overall corporate strategy, customers and competition. Production metrics, on the other hand, are favoured to be constant and rigid due to familiarity and benchmarking reasons. This paradox exacerbates the risk of organisations being stuck with obsolete performance measurement systems (Melnyk et al., 2005) and most organisations today have only static performance measurement systems (Bititci et al., 2000). It is evident in both business and academia that the design of the measurement systems needs to ensure a dynamic capability in order to stay aligned with the business environment (Gregory, 1993; Ghalayini and Noble, 1996; Najmi, Rigas and Fan, 2005; Neely, 2005; Bourne, 2008; Salloum et al., 2010).

2.4 *Dynamics characteristics*

The use of a performance measurement system with dynamic abilities allows change in priorities to propagate throughout the business, through its critical business units and business processes to its suppliers. By ensuring dynamics in a performance measurement system, Bititchi et al., (2000) argues that the system is able to:

- Being sensitive to changes in the external and internal environment of the organisation.
- Reviewing and prioritising internal objectives when the changes in the external and internal environment are significant enough.
- Deploying the changes to internal objectives and priorities to critical parts of the organisation, thus ensuring alignment at all times.
- Ensuring that gains achieved through improvement programmes are maintained.

To achieve this dynamic ability, Kennerley and Neely (2003) suggest that the evolution of a system is possible through execution of three phases:

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

Besides the phases, Kennerley and Neely (2003) describe four factors for enabling a dynamic ability in the measurement system; process, people, infrastructure and culture. The *processes* for reviewing, modifying and deploying measures need to be existent. The *people* with the skills and knowledge to understand how to execute the processes are also required. *Infrastructural* capabilities such as flexible systems enabling collection, analysis and reporting of appropriate data need to be in place. Finally, a *culture* that appreciates the value and importance of performance measures need to be in place in order to maintain the relevance and appropriateness of them.

In addition, Searcy et al (2007) identifies the need for a governance structure for the ongoing and continuous evolution of the system. Interaction between the measures should be explicit and a change should be sensed throughout the system and amongst the individual measures (Bititci et al., 2001). Finally, to ease the development of a structure for the measurement system it should have formal systems criteria (Searcy et al, 2007).

In a longitudinal study conducted by Townley et al (1998) it was concluded that one obstacle to the evolution of a measurement system is the experienced fade in support over time resulting in increased scepticism instead of enthusiasm towards it. Bourne et al (2000) conclude that measures can evolve naturally, however, if kept unchecked they can diverge from the strategic direction. Further, underestimation of effort and lack of commitment to change are also factors that were identified as impacting. Finally, political issues and the involvement of employees in the process also proved to be affecting to the viability of the system.

Recent empirics shows that situations can arise where managers use familiar measures to shape objectives being pursued due to fear to deploy new unfamiliar measures (Melnik et al., 2005). And in some cases, managers see and realises benefits from misalignment between measures and strategy such as the enhancement of career benefits, justification of poor performance, the need for more resources and increased control over activities (Pongatichat and Johnston, 2007).

3. METHOD

This paper is based on a participatory case study following an industrial company project executed between March and December 2010. The purpose of

the project was to improve the company's performance measurement support structure. The objective of the study was to follow an effort of creating dynamic abilities in a production performance measurement system, by re-designing and implementing a support structure.

The nature of the study gave the researcher the possibility to be in close proximity to the studied object for a longer period (Halinen and Törnroos, 2005). This was advantageous as it gave the researcher the opportunity to study the object from several perspectives in multiple situations and hence increase the understanding for the phenomenon.

In the role as an industrial researcher the results presented in this paper allude to be relevant and applicable for the academic and industrial communities alike. In order to create the dual relevance the researcher has moved constantly between practice and academia in an iterative process in order to combine theory with real world contact (Fagerström, 2004).

Furthermore, in the pursuit of dual applicability, action research has been conducted. For this paper action research will be defined as proposed by Reason and Bradbury (2001), a participatory and democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes. It seeks to bring together action and reflection, theory and practice, in participation with others.

One of the most contributing parameters to the choice of method is the availability of data. As an industrial researcher at the studied company, high availability of a large amount of data related to the investigated phenomenon was made available. The data used for analysis are based on direct and participative observations, workshop reports, open and semi-structured interviews and documentations such as project status reports and emails and internal websites. Furthermore, a journal has been written during the entire study and has also been used as an important input to this paper. The journal has been used as a diary for observation, documentation, experience and reflection as suggested by Coughlan and Coghlan (2002).

The output was contrasted to the findings in the literature study. When this had been done the more subjective parts of the collected data was analysed. The decision making process within the project group, the dynamics of the project group and corporate politics were scrutinised and contrasted to the findings of the literature study.

The analysis had a dual purpose, to test the applicability and impact of the findings from the literature study and to investigate whether any further parameters had been identified from the empirics.

4. CASE INTRODUCTION

The case company is a large Swedish manufacturing company located in the region of Mälardalen. The

author of the paper was at the time of the case study an Industrial PhD student at the company.

The company group which the company belongs to have a central function on corporate level that assesses the maturity of the deployed production system in order to track and motivate the development of its manufacturing function. The assessment results are used to compare the various production units worldwide but also to spread the best practices around the company group.

At the autumn of 2009 the business unit (BU) which this case is focused around reached an assessment point of 1.0 out of 5.0. This was perceived as a great disappointment within the business unit but also in the management team for the geographical region in which the BU belongs to. The assessment point in combination with the release of a global strategic objective to reach a point of 2.0 by the end of 2012 triggered the management team of the BU to act. A large scale project was set up with the purpose to develop the production system and hence reach higher assessment scores.

The project structure mirrored the design of the production system (that was designed at corporate level for the whole company group) with five different principles representing the five different components of the production system. These principles were in turn broken down into different modules to reflect the various tools, mechanisms and policies that permeate each principle in accordance to the corporate level production system design. The overall goal for the project was to reach an assessment point of 2.0 before the end of 2010.

In order to integrate the project into the daily work of the BU, the management team members became principle owners with the highest responsibility for the result of their principle. The production system department members became principle coaches and played a consulting role which incorporated to help and assist the members of the principle. The various modules within each principle were assigned to the persons in the organisation with appropriate backgrounds for the given task. These module owners were responsible for their respective part of the principle and had the responsibility to drive the work forward in their module and reach the given assessment goal point. The project was divided into two steps; gap analysis and implementation.

5. THE PROBLEM IDENTIFICATION PROCESS

The case company had an existing process for cascading production performance measures; the *result plan process*. The core of the case study was the re-design of this process, as an effort of creating a dynamic ability. In order to put this effort in context, this section introduces the concept of goal oriented teams and the gap analysis conducted prior to the re-design of the result plan process.

5.1 Goal Oriented Teams: GOT

The cascading and monitoring of performance measures is on the operative level tied to the goal oriented teams of the company. They play a key role in building the performance measurement process, a process in need of dynamic abilities. The author was appointed module owner of goal oriented teams (GOT). The goal of the module is according to the reference material released from the corporate production system function to:

- Achieve alignment of goals and measures throughout the whole organisation.
- Empower the team members to improve performance and deliver on results.
- Give prerequisites for the teams to react and act when needed.

5.2 Gap Analysis

With the assessment score (0.67 for this specific module) in mind, a reference group, chosen by the module owner, was summoned for a three hour long workshop. The reference group consisted of various functions of the organisation ranging from assemblers and operators to team leaders and departmental managers. The problem workshop included the background of the project and the module, and a post-it exercise. The purpose of the exercise was to generate the reference group's thoughts towards why the module was underdeveloped and hence created the foundation of the gap analysis. The output of the exercise for goal oriented teams was clustered into the headings of the assessment matrix used by the assessors.

The module owner started out from the problem workshop output, target images and assessment matrix to create a list of actions in order to fill the gap. These actions in combination with the target image formed then the base for the project plan (or module plan as it became known as). The project plan incorporated a time plan for all actions until the year end. The module plan became central for the ongoing work with the module and for reporting the progress to the principle team. Principle team meetings were set once a week with the three module owners, the principle coach and the principle owner to monitor the progress.

6. IDENTIFIED SHORTCOMINGS

When analysing the output from the problem workshop it became apparent that much of the problems and troubles existing was due to the non-existence of process documentation for cascading goals (the result plan process) as well as the lack of a process owner.

6.1 Introducing the result plan

The purpose of the result plan process is to enhance result and measurement culture and ensure that measures and objectives are cascaded throughout the organisation (Figure 1). The result plan is an Excel document that incorporates performance measures and objectives for the whole year as well as more specific goals and measures for the quarter are lined up on the result plan. The process is accompanied by a three

layered meeting structure; yearly, quarterly and weekly meetings.

The yearly meetings purposes to develop the strategy, set the goals and measures for the coming year and cascade them throughout the organisation. The quarterly meetings allude to review, modify and update measures and goals depending on performance and changes in both internal and external environments. Finally, the weekly meetings purpose is to follow up the plans. Both the yearly and quarterly meetings were scheduled to take four hours while the weekly follow up meetings were only meant to take three minutes per participant.

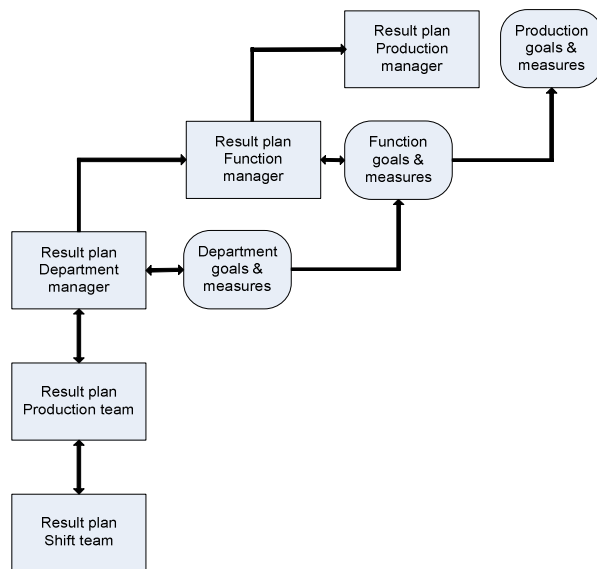


Figure 1: The result plan process visualised. The process purposes to create coherence and alignment in for both organisation goals and performance measures.

Besides developing and updating strategy, measures and objectives, the yearly and quarterly meetings gives managers an opportunity to agree on the result plan with their clerks, production and shift teams. This agreement is called *the handshaking procedure* at the BU. The handshaking procedure alludes to give coherence in the goal setting of the organisation and to secure that consensus is reached between manager and employee regarding what to focus on.

The meeting structures for both the yearly and quarterly meetings are meant to be chronologically hierarchical. In other words, a top down approach is taken towards how to execute the meetings. The top management initiate a session of meetings before the functions, departments and teams have their meetings in a consecutive fashion. The process is designed this way in order to create coherence in the goal setting of the organisation and to cascade goals and measures.

6.2 Shortcomings in the result plan process

The intention of the process was however not realised in reality. Through the output of the problem workshop it

could be concluded that the ambition of the efficient cascading process fell short due to several reasons besides the lack of documentation of the process and the existence of a process owner:

- Not everyone had a result plan.
- The handshaking procedure was not working.
- Confusion regarding what to report and what to present.
- The meeting structure not working.
- Yearly and quarterly meetings not hierarchically chronological.
- No explicit relationship to the performance measurement scorecard.
- Lack of understanding regarding the requirements of change.

6.2.1 Not everyone had a plan

In reality, the result plan template that was meant to be standardised looked different from function to function. This spun off to a situation in which performance measurement scorecards were accepted as result plans even though no similar characteristics existed. Even though parts of the top management team were convinced that everyone had a result plan it became apparent that the routine was not even followed by all of themselves. The traceability from the production manager's result plan down to the lower levels of the organisation became invisible due to the various templates and variants used.

6.2.2 No handshaking's

Further, the handshaking procedure fell short throughout the organisation. The consequence was that result plans were not approved by the closest manager. The lack of handshaking decreased the level of control and contributed to disoriented coherence in the goal setting of individual departments and the BU strategic direction and goals. The risk of disoriented coherence increased further down the organisation with more people involved and further away from the source of overall BU decision making. As a consequence, measures started to evolve naturally, with no respect to the direction of the above hierarchical measures.

6.2.3 What to report? What to present?

For the weekly meetings a specially constructed presentation was generated with the purpose of making the reporting more clearly visualised. Instead of using the result plan which contained a lot of information with goals and measures that had no recent activities, the presentation purposed to make the reporting more concise and relevant. Hence, the result plan was not showed in the weekly meetings. This resulted in people only updating the presentation and not their result plan. The result plan lost its characteristic as an active tool and became a document that only got updated every quarter of a year and not looked at in between.

6.2.4 Lack of meeting structure

The meeting structure with yearly, quarterly and weekly meetings was flawed further down the organisation it was investigated. Both the yearly and quarterly meeting were not held regularly at shift and production team levels in large areas of the organisation. The effort and commitment required holding the meetings in the midst of day-to-day activities. The goals of high delivery precisions made managers ignore the meetings. Further, the lack of inquiry for these meetings by higher management made them perceived as less important. A paradox rose with higher management on one hand blissfully thinking that the process worked and hence not demanding it and the other hand the lower management, knowing that the process did not work, but did not change their behaviour due to the lack of demand for it.

6.2.5 No hierarchically chronological meetings

The idea with the yearly and quarterly meetings is to deploy them in hierarchical order down the organisation. Once the top management team has decided on the plants overall goals and performance measures the next level, the functions, hold their meetings and so on. Once they have reached consensus the next hierarchical level have their meetings. The yearly meeting was meant to be held in close proximity of a new year. However, in reality no coherence existed in the planning of meetings and the hierarchical positioning was not considered. Furthermore, the yearly meetings could be held as far into a year as quarter two. In those cases, no goals had been developed or updated for the first quarter of the year for parts of the lower levels of the organisation.

6.2.6 No explicit relationship to the performance measures scorecard

The performance measures set at the yearly meetings are meant to be derived from the scorecard of the organisation in order or to reach coherence in goal setting and follow up. The idea was to use the scorecard as tool for reporting goals and measures and the result plan as a tool for working with goals and measures. But, due to the lack of working process no consistency was reached in the lower levels of the organisation between the scorecard and result plan.

6.2.7 Lack of understanding regarding the requirements of change

The evolution of the measurement system throughout the organisation became a trifle for the higher management. Even though they recognised it as important they did not realise the effort required in order to execute it throughout the organisation. They were limited to their own measurement system and perceived an evolution of it as an evolution of all measures in the organisation. Further, as it was perceived as a minor mechanism, the commitment needed for change in the measurement system was non-existent.

7. RE-DESIGN OF A DYNAMIC PROCESS

In light of these shortcomings it became apparent that the process was in need of a re-design and documentation. Four steps were taken:

1. A re-design of the process.
2. Evaluation workshop with top management team.
3. Evaluation workshop with lower management teams.
4. Re-design and ratification of the process.

The first step was for the project leader to develop a process with complimentary documentation together with the management consultant with the needs of the BU as starting point. A three step process with documentation for each hierarchical and templates was developed based on the initial idea and output of the problem workshop. The relationship and links between the measurement system and result plan process was made explicit and clear in the process description. Once the process was set it was presented to the greater parts of the top management team for feedback. After the workshop with the top management team the process was presented to the lower management teams for their feedback. After the feedback had been collected, the process was re-designed and then ratified.

7.1 Re-design proposals

The proposed process included several re-designs. It was suggested, due to poor updating and visualisation of the result plan, that the specially constructed presentation should be abolished. This would also eliminate the non value-adding activity of updating two documents on a weekly basis. Even though the management team accepted the re-design at the evaluation meeting they decided to keep the presentation at their own management meeting.

Further, to oppose the paradox with missing result plans, no handshaking's and to create a clear and explicit link to the measurement system it was suggested that instead of keeping the plans listed as each respective departmental website, one common internal performance management website would be created. The website would incorporate all the result plans in the BU and the performance measurement scorecard and increase the controllability and vitality of the way of working. It would become easy for a process owner to check that all the plans existed and that they were up to date via the document information provided. The idea was opposed with the motivation that an organisation should not strive for control.

One last re-design was proposed: a software that would integrate the measurement system and the result plan process. The software would visualise the organisation as a pyramid with the overall performance measures at the top of it. Every result plan in the organisation would then be incorporated in the pyramid at the appropriate hierarchical level with main tasks, goals and measures visible. The software would secure that all goals and measures of the organisation origins from the

measurement system. The software would enable the organisation to:

- Enhance the understanding of the cascading and traceability of the goals throughout the organisation.
- Make the relationship between measures at various levels of the organisation explicit.
- Restrain sub-optimisation.
- Integrate the measurement system and result plan process to one process.

The idea was however turned down due the budget issue of the initial investment cost.

Furthermore, after both evaluation workshops two correlated problems were identified. Firstly, the length of the yearly and quarterly meetings would affect the planned production time. As the plant had minimal inventories between production cells a longer stop in one machine group would trigger standstill downstream the process. Secondly, in order to create a hierarchical queue of yearly and quarterly meetings someone would need to coordinate them so that it would be made sure that they would be held on time and efficiently trigger each other.

The project leader proposed that he as a process owner would plan and schedule the meeting in proximity of each other and that they would occur directly before or after each quarter. They should also be synchronised with the production planning department so that low rates of work load in production and meeting periods are harmonised with each other. The proposal was firstly declined with the motivation that nothing could be important enough to interfere with the planned production time and that the meetings would self organise. However, after a period of reflection the proposal was accepted.

8. DISCUSSION

The theoretical background presented a number of critical factors for creating a performance measurement system coping with the dynamics of the business environment. The case study illustrated an effort in developing a support structure that would enable such a dynamic ability. In this discussion, the case is contrasted to the critical factors from literature, as well as introducing a set of additional factors.

8.1 Relating the case to the theoretical background

A dynamic measurement system need to have in place processes for reviewing, modifying and deploying measures (Kennerley and Neely, 2003; Bititci et al., 2000; Searcy et al., 2007). The case company had incorporated these processes into one: the result plan process. However, the failure of documenting it as an explicit process with explicit ownership resulted in confusion regarding the goal setting in the organisation and made the whole way of working inapplicable and defying its purpose.

As no reference point existed to what a result plan should look like, what the outputs of a yearly meeting are or who owns the way of working anything could be, and was, justified. Further, the non-existence of a documented process perished the opportunity to continuously improve and develop the process. These findings support the findings of Searcy et al (2007) that ask for formal systems criteria to be outlined for a measurement system. The measurement system needs to be explicitly outlined and defined in order to enable it to function in a complex environment were misunderstandings are easily caused. Moreover, the inapplicability of the handshaking procedure created a situation where measures started to evolve naturally irrelevant of the direction of the above hierarchical measures and hence strengthening the findings of Bourne et al (2000).

Further, according to Bititci et al (2000) the measurement system needs to be sensitive to changes in both internal and external environments and be able to prioritise after these changes. Furthermore, the system needs to be sensitive to changes among individual measures and channel them throughout the organisation (Bititci et al., 2001). As the BU is a component supplier with only company internal customers the need for an external monitoring system is limited and no traces of it could be found. However, even though no distinct internal monitoring system existed the quarterly review meetings were designed to facilitate reflection and discussion over the evolving internal capabilities of the BU. Further, the meetings were also laid out to facilitate changes in the measurement system and deploy them down the organisation.

Once the process had been outlined and documented it was realised that it would be difficult to implement it without coordination. Besides the missing process documentation the lack of a process owner was problematic. A process owner had to be put in place to coordinate the time sensitive activities goal deployment through the yearly and quarterly meetings. The efforts required to execute a change were not fully accounted for and the commitment of the management came under the spotlight after the revelation that not everybody had result plans - validating the findings of Townley et al (1998). Further, the findings also put one of the enabling factors of Kennerley and Neely (2003) into focus, namely *people*. With the lack of commitment to change and effort one could possibly question if the knowledge and skills to execute the process existed. The case study displays that the awareness and knowledge of the top management was limited of how to execute the process and the effort and commitment that it required.

Kennerley and Neely (2003) argues that flexible systems, or *infrastructure* as they label it, are an enabling factor for evolving measurement systems. Even though infrastructure was not a central factor in this case study, software was proposed to make the handling, control and efficiency of the system greater. Hence, infrastructural capabilities can indeed play a

crucial role regarding the capacity of the measurement system. Furthermore, the same authors state *culture* as an enabling factor and judging by the purpose of the deployment of the result plan process, to enhance the result and measurement culture, the factor is indeed enabling.

Instead of displaying the result plan at every weekly meeting the presentation template is still in place and visualised. As discussed earlier, this led to a situation with result plans only being updated during the quarterly meetings and not used in between. However, the resistance toward the abolishment of the presentation and sole use of the result plan was too strong to make it reality.

Even though the result plan process is in essence a tool of goal alignment and not a tool of control, certain control mechanisms need to be in place. As of the situation at the case company the result plans were kept at each department's internal website and the measurement system was kept separated at the internal website for the BU. This complicated the process of allocating a given result plan due to access rights and location of the websites. Without being able to see the process working holistically the higher management team trusted that it was working and hence they did not inquire nor request it. This resulted that the process diverged even further from its supposed purpose.

Further, the links between the measurement system and result plan process became vague and indistinct. The suggestion in the re-design was to allocate the measurement system and its components in combination with all the result plans to one internal website for performance accessible to all employees. This would have enhanced both the accessibility for measures and plans alike and would have boosted the knowledge for the measurement system while enabling the process owner to easily check the coherence to the method. Certain tools of control or measures of the structure of the process need to be in place in order to ensure that the organisation works after the requested method. This becomes even more important in the long run as enthusiasm towards measurement systems are replaced by scepticism.

No situations during the case were recorded where managers tried to use familiar measures to shape objectives or to benefit from misaligned measures as suggested in some parts of the literature (Melnyk et al, 2005; Pongatichat and Johnston, 2007).

8.2 Additional factors emerging

Firstly, regarding the need for the process, it needs to be applicable and explicitly documented. The first mistake corrected in the case study was to document the process and all templates related to it. Moreover, after realising that the process was too complex to apply without the support of a process owner with responsibility of execution one was put in place. The proactive coordination of the change in the measurement system is needed and should be the

responsibility of the process owner. In an environment with deadlines, requirements of delivery and a scarce amount of time available, attention can easily be diverted from the execution of the evolution of the measurement system if it is not someone's responsibility.

Secondly, the levels of information existing today in organisations are vast and dense. In times of change the level of information amplifies as organisations find themselves in transit between two different strategies and two different sets of performance measures. Information transparency is required in order to distinct between obsolete and current material and information. The usage of a hub where information is collected and disseminated makes the transition between measures and goals explicit and clear for the higher management but also the employees and the lower management. It eliminates confusion and the risk of steering and gauging obsolete measures and provides one portal regarding performance measures.

Finally, the process of cascading goals and measures is traceable in essence. The measures and goals should be related throughout the organisation from the top management to the lowest departmental levels. By visualising this relationship and make the set of measures and goals at all levels of the organisation public and explicit it will become easy to detect where measures and goals are not coherent and where the measurement system has not been updated. In order to enable a measurement system to evolve over time as strategy alters, following four factors could summarise the need found in the case to integrate to the design of the system:

- Information transparency.
- Proactive coordination.
- Documented process.
- Visualise traceability.

8.3 Concluding into a synthesised model

Based on the findings in this paper it is undeniable that all tested parameters from literature affect the evolution of a performance measurement system to some degree. These parameters, as well as the more case specific ones, have been summarised in figure 2 under four subheadings; processes, systems, people and culture.

Processes for reflection/review, deployment, modification and coordination need to be in place. These processes also need to be documented and recognised as the standardised way of working.

A *culture* that strives for commitment to change, high involvement of employees, appreciation of performance measures and finally that supports the measurement system over time must be in place.

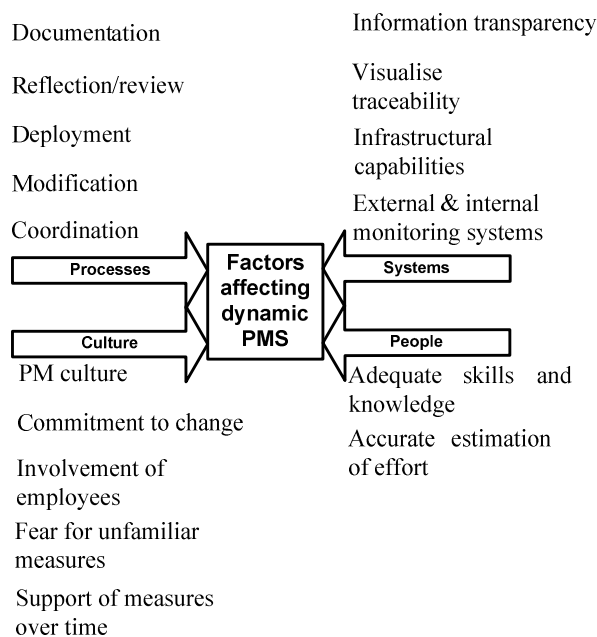


Figure 2: Dynamic abilities of performance measurement systems.

Systems for flexible handling of data and information are essential for enabling dynamical abilities. Systems that can handle and create information transparency and visualise traceability need to be installed. Further, depending on the situation, systems for monitoring internal and external change should be put in place.

Finally, the knowledge and skills of the *people* to handle the various processes, systems and facilitate the culture are required. The handling of all three components is essential as they are equally important for creating dynamic abilities. Furthermore, the competence to accurately estimate the efforts required are also important in order to enable the measurement system for becoming truly dynamic.

With these parameters included in the design of a performance measurement system or in the design of its support structure an organisation is in a favourable position to realise dynamic abilities to its performance measures that would allow it to keep up and reflect ever-changing environments and market conditions. However, further research is needed regarding how to make the factors applicable in organisations.

8.5 Implications for practitioners

As discussed earlier, a paradox exists of combining evolving strategies with rigid measurement systems. By creating dynamic measurement systems practitioners can ensure that performance measures are up to date as strategy and environment alters. The model presented in this paper provides a compilation of factors that are useful for practitioners seeking to enable dynamic abilities for their performance measurement systems.

9. CONCLUSION

The purpose of this paper was to present the re-design and implementation of a dynamic support structure at one of the leading construction equipment companies in the world. The case presented is a participatory case study that stretches over 10 months and follows a project leader with the task of re-designing and implementing a support structure for a performance measurement system. From the case four factors emerged as important in the design of evolving measurement systems:

- Information transparency.
- Proactive coordination.
- Documented process.
- Visualise traceability.

Besides the emerging factors other parameters found in literature were put to test and it was concluded that they all affect the evolution of a performance measurement system to some degree. The challenge is to design a measurement system or a support structure that incorporates all these parameters and is applicable in practice.

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11. REFERENCES

- [1] Santos, S.P, V. Belton and S. Howick (2002). Adding value to a performance measurement by using system dynamics and multicriteria analysis. *International Journal of Operations & Production Management*. Vol. 22 No. 11, pp. 1246-1272.
- [2] Paranjape, B., B. Rossiter and V. Pantano (2006). Insights from the Balanced Scorecard: Performance measurement systems: successes, failures and future - a review. *Measuring Business Excellence*. Vol. 10 No. 3, pp. 4-14.
- [3] Kennerley, M. and A. Neely (2003). Measuring performance in a changing business environment. *International Journal of Operations & Production Management*. Vol. 23 No. 2, pp. 213.
- [4] Searcy, C., S. Karapetrovic and D. McCartney (2006). Application of a systems approach to sustainable development performance measurement. *International Journal of Productivity and Performance Management*. Vol. 57 No. 2, pp. 182-197.
- [5] Fiorentino, R. (2010). Performance measurement in strategic changes. *Performance Measurement and Management Control: Innovative Concepts and Practices*. Vol. 20 pp. 253-283.

- [6] Neely, A. (2005). The evolution of performance measurement research. Developments in the last decade and a research agenda for the next. *International Journal of Operations & Production Management*. Vol. 25 No. 12, pp. 1264-1277.
- [7] Bourne, M. (2008) Performance measurement: learning from the past and projecting the future. *Measuring Business Excellence*. 12(4), pp. 67-72.
- [8] Ghalayini, A.M. and J.S. Noble (1996). The changing basis of performance measurement. *International Journal of Operations & Production Management*. Vol. 16 No. 8, pp. 63-80.
- [9] Dixon, J.R., Nanni, A.J. and T.E. Vollmann (1990). *The New Performance Challenge – Measuring Operations for World-Class Competition*. Dow Jones-Irwin, Homewood, Illinois.
- [10] Neely, A., M. Gregory and K. Platts (2005). Performance measurement system design: A literature review and research agenda. *International Journal of Operations & Production Management*. Vol. 25 No. 12, pp. 1228-1263.
- [11] Eccles, R.G. (1991). The performance measurement manifesto. *Harvard Business Review*. January/February pp. 131-137.
- [12] Kaplan, R.S. and D.P. Norton (1992). The balanced scorecard – measures that drive performance. *Harvard Business Review*. January/February pp. 71-79.
- [13] Cross, K.F. and R.L. Lynch (1992). For good measure. *CMA*. Vol. 66 No. 3, pp. 20.
- [14] Neely, A., C. Adams and P. Crowe (2001). The performance prism in practice. *Measuring Business Excellence*. Vol. 5 No. 2, pp. 6-12.
- [15] Gregory, M.J. (1993). Integrated performance measurement: a review of current practice and emerging trends. *International Journal of Production Economics*, Vol. 30-31, pp. 281-96.
- [16] Niven, P.R. (2006). *Balanced scorecard step-by-step: Maximising performance and maintaining results*. John Wiley & Sons, Inc., New Jersey.
- [17] Salloum, M., Wiktorsson M. (2009). From Metric to Process: Towards a Dynamic and Flexible Performance Measurement System for Manufacturing Systems, 3rd Swedish Production Symposium 2009, Gothenburg, Sweden.
- [18] Waggoner, D., A.D. Neely and M.P. Kennerley (1999). The forces that shape organisational performance measurement systems: An interdisciplinary review. *International Journal of Production Economics*. Vol. 60 No. 61, pp. 53-60.
- [19] Kaplan, R.S. and D.P. Norton (1993). Putting the balanced scorecard to work. *Harvard Business Review*. September-October, pp. 134-147.
- [20] Neely A. (1999). The performance measurement revolution: why now and what next? *International Journal of Operations & Production Management*. Vol. 19 No. 2, pp. 205-228.
- [21] Cokins, G. (2004). *Performance Management, finding the missing pieces to close the intelligence gap*. John Wiley & Sons, Inc., New Jersey.
- [22] Melnyk, S.A., J. Calantone, J. Luft, D.M. Stewart, G.A. Zsidisin, J. Hanson, L. Burns. (2005). An empirical investigation of the metrics alignment process. *International Journal of Productivity and Performance Management*. Vol. 54 No. 5/6, pp. 312-324.
- [23] Bititchi, U.S., T. Turner and C. Begemann (2000). Dynamics of performance measurement systems. *International Journal of Operations and Production Management*. Vol. 20 No. 6, pp 692-704.
- [24] Najmi, M., J. Rigas and I.P. Fan (2005). A framework to review performance measurement systems. *Business Process Management Journal*. Vol. 11 No. 2, pp. 109-122.
- [25] Salloum, M., M. Wiktorsson, M. Bengtsson and C. Johansson (2010). *Aligning Dynamic Performance Measures*, 6th European Conference of Management, Leadership and Governance, Wroclaw, Poland, October 2010.
- [26] Bititci, U.S., P. Suwignjo and A.S. Carrie (2001). Strategy management through quantitative modelling of performance measurement systems. *International journal of Production Economics*. Vol. 69, pp. 15-22.
- [27] Townley, B., D.J. Cooper and L. Oakes (2003). Performance Measures and the Rationalization of Organizations. *Organizational Studies*. Vol. 24 No. 7, pp. 1045-1071.
- [28] Bourne, M., M. Wilcox, A. Neely and K. Platts (2000). Designing, implementing and updating performance measurement systems. *International Journal of Operations & Production Management*. Vol. 20 No. 7, pp. 754-771.
- [29] Pongatichat, P. and R. Johnston (2007). Exploring strategy-misaligned performance measurement. *International Journal of Productivity and Performance Management*. Vol. 57 No. 3, pp. 207-222.
- [30] Halinen, A. and Törnroos, J-Å (2005). Using case study methods in the study of contemporary business networks. *Journal of Business Research*. No. 58 pp. 1285-1297.
- [31] Fagerström, B. (2004). *Managing distributed product development, in a Division of Product and Production Development*. Chalmers Technical Institute. Göteborg, Sweden.
- [32] Reason, P. and H. Bradbury (2001) *Handbook of Action Research: Participative Inquiry and Practice*. Sage, Thousand Oaks, California.
- [33] Coughlan, P. and D. Coughlan (2002). Action research for operations management. *International Journal of Operations & Production Management*. Vol. 22 No. 2, pp.220-240.