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Relying on the past and predicting the future: interrelating perspectives in Operations Strategic Management Systems

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Abstract

The complexity and dynamics of nowadays enterprises' environments and operations systems are demanding an integral approach for designing and implementing their operations' strategic management and control systems. This integral approach should be capable to deal with the short and long term perspectives, helping the enterprises to manage their positions, processes and paths for a sustainable development. This paper is a theoretical construction based on Operations Management and General Systems theory, intending to discuss and propose a new "architecture" for the strategic management system of the operations function. The findings of the research project related in this paper show the systemic representation of the functionalities and features that a strategic management system for the operations function should develop to accomplish the related task. The developed framework as theoretical construction is willing to review the cognitive and mental models that the operations managers are using for managing the operations systems.

Keywords: strategic management, strategic control, operations strategy, performance management, systemic approach

Introduction

The multi-dimensional characteristics of enterprise performance are challenging the operations system management models. Such characteristics are related to: the complexity of factors involved; the dynamic associated with the internal and external variables that define the operations strategic management system, and their external environment; the strong links that inter-relate short and long term perspectives of operations strategy planning systems; and the increasing use of resource and competence based views in operations strategy specification and design.

The increasing competitive pressure as a result from the globalization of operations activities and markets, are forcing the enterprises to reorient their strategies, operations, processes and procedures to sustain their competitive positions. The complexity and dynamics of the competitive arena that involves the enterprises operations systems should be assessed and integrated to the organizations performance management. The changes that are being introduced in the enterprises operations systems design are the result to their change process to face the increasing competitive pressures that are presented in this new competitive arena. The redesign of the operations systems cover organizational and management processes, specifically, the organizations are paying closer attention to the changing nature of the operations systems performance. In fact, the operations strategic management system, particularly the performance measurement subsystems, processes and measures used in the enterprises performance evaluation are the main focus of the redesign projects (Gomes *et al*., 2004).

The process of redesigning the operations strategic management system are looking for a more "balanced", "integrated", "linked", "flexible", "multifaceted" and "multidimensional" management system. These properties should reflect the performance measurement system specification, when describing the whole operations strategic management system. Although, the firms are increasingly utilizing non-financial performance measures in their decision-making processes (Burns *et al*., 1997), there is very little evidence that these measures are formal and directly linked to the firm's strategy and effectiveness. These actions are not integrated to the operations strategic management processes, and could not offer the opportunity for firms to better understand their operations systems environment and to increase their performance level. It is important for the enterprise strategy realization to have consistency in their actions pattern (Gomes *et al*., 2004; Slack, 2000; Platts, 1995).

There is a common belief in the organizations operations management practices that if the performance measurement system is redeveloped, there will a positive impact in the organization's overall performance (Bourne *et al*., 1999). That belief is often the basic reason for starting the redesigning process; however, the recent research results suggest that there is no success guarantee. In fact, the main issue is related to the operation and management of a strategic system (Bourne *et al*., 2005).

Franco-Santos and Bourne (2003) detach that organizations devote time and effort to the development of strategic performance measurement systems and that there are a grounded literature in how to design and implement this type of system. They also identified that few studies try to understand why some organizations are better able to "manage through measures" than others. This question is, in fact, related to managing

strategically the organizations performance and needs an in deep comprehension of: the interplay between action and measurement; the performance information use in their decision-making processes, and their subsequently actions. It is not clear what critical factors enable organizations to effectively use their strategic performance measurement system. The presented paper develops this discussion in the level operations management systems, trying to understand the relationships between performance and strategic management systems.

The theoretical discussion established in this paper intends to contribute to the research and practice of implementing and using strategic performance measurement systems. Particularly, it is addressing some issues that were suggested for future research by Franco-Santos and Bourne (2005) as to investigate: certain characteristics of performance measures (e.g. validity, reliability, etc.), in the context of required strategic management features; and relationship between business performance measurement systems and other management systems, that is, the connections, interfaces and integration with the operations strategic management system.

Neely *et al*. (2005) develop a framework to deal with the performance measurement system in three different levels: the individual performance measures; the set of performance measures; and the relationship between the performance measurement system and his environment. The presented paper explores the performance measurement system as an entity, and develops a theoretical model to explain the multiple inter-relationships that this system has with their environment and with its contents and process variables. The focal point is to organize the dimensions and approach to study the system structure and dynamics.

The intended contribution of this work could also be related to Neely *et al*. (2005) work, relating its studies to the identified issues that need researching. In issues associated with individual measures of performance domain, it could be related to the question "How can one ensure that the management loop is closed – that corrective action follows measurement?" When approaching the performance measurement system as an entity, it contributes to the understanding of what are the "definitive" principles of performance measurement system design; and to identify what techniques can managers use to reduce their list of "possible" measures to a meaningful set. Studying the issues associated with the system and its environment, questions like "Why do firms fail to integrate their performance measures into their strategic control systems?" and "How can we ensure that the performance measurement system matches the firm's strategy and culture?" are orienting the development of the presented research.

It is not so difficult to justify studies related to the strategic use of performance measurement systems, but the comprehension of its role in nowadays companies' operations strategic management systems is a challenge that motivates the whole work presented in this paper. The performance measurement role of being a management system to control the operations strategy implementation is fully understood, but the emergent role of reviewing structures and processes that founds the operations strategic management system needs an in deep investigation. The predictive performance measurement behavior is increasingly been developed through techniques like statistical process control or through models or frameworks founded in capabilities development. The long term perspective of the strategy is presented in the performance measurement

system design, as an attempt to interconnect the resources utilization with future performance. The capabilities models and the activities and processes play a role to mediate this relationship and give to this study an analysis focus (Neely *et al*., 2005; Flynn and Flynn, 2004; Slack *et al*., 2004; Maslen and Platts, 2000; Flynn *et al*., 1999).

The strategic performance approach

Established the guidelines of this study, it is important to choose or develop an approach to address the main research question of this work, which is to study the dynamics and structure of an operations strategic management system. This paper is focused on the understanding of the performance subsystem role, as part of an operations strategic management system.

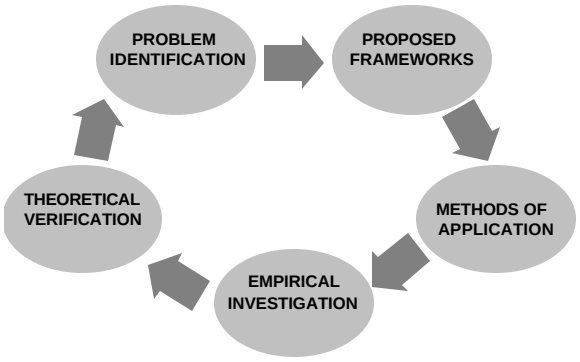
Initially, it is important to understand the role of this research work in three different levels. First, it will be related to the rationalities used in the Operations Management – OM – field, specifically in the domain of the Performance Management – PM – discipline, for producing knowledge that will be consolidated in theories. For this purpose, the frameworks developed by Neely (2005) and Slack *et al*. (2004) are used to show the intended contribution nature of this paper.

Slack *et al*. (2004) question if OM research should in fact produce new ideas, as its main orientation in creating and developing knowledge and theories for the OM field evolution. They propose that the real orientation that must be taken by the field is to continually looking for a point of research/practice reconciliation. They acknowledge that

this is not a trivial task, but if it is accepted that OM's principal academic role is to 'conceptualise' practice and 'operationalize' theory, the rationality that founds the OM field evolution will be finally comprehended. In this way, the OM field would be better recognized not as a "normal" functional management discipline but rather as a knowledge broker in the whole knowledge producing process (Nonaka and Takeuchi, 1995). In this sense, OM methods would provide an important contribution in improving the enterprises operational and strategic activities. The research presented in this work assumes the role research/practice reconciliation, trying to develop and test practical solutions for the operations strategic management system.

Neely's (2005) theoretical construction, which is represented in the Figure 1, could be used as a meta-framework to position the presented discussion in the evolutionary life cycle process that is being developed, and that founds the discipline of performance management development. In the early stages of the discipline, a great effort was developed to identify the main problems, followed by a structuring activity based on theoretical frameworks proposition that organized and addressed the knowledge body of the discipline to solve the identified problems. Based on the proposed frameworks, processes were developed to test them and it was possible verify the robustness correctness of the developed models and methodologies through empirical investigation. This interplay between analysis and synthesis allows the evolution and consolidation of the theoretical body of discipline knowledge. It is expected that the cycles successively evolve and that a continuous process of learning and knowledge creation is established. In fact, it could be identified two 'pictures', the big one that shows the whole evolution of the discipline, as presented by Neely (2005), and a specific context that could be used to

explain the approach of this paper in producing and testing the models and methodologies developed in the performance management discipline.



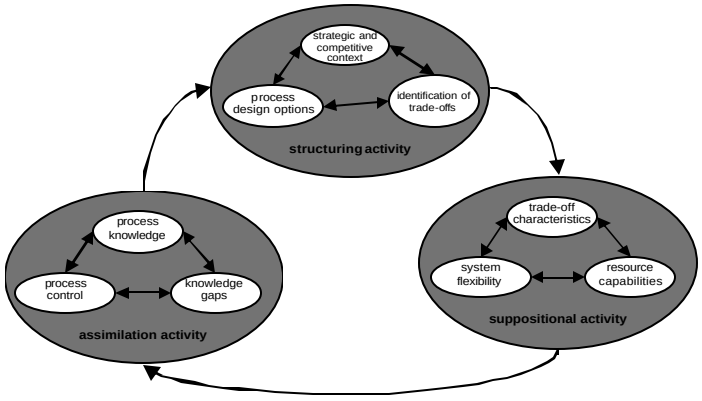
Source: Neely (2005)

Figure 1 - The evolution of the field of performance measurement

The second level that the presented research is related explains how it addresses practical issues, in designing, implementing and managing operations strategic management systems. A process approach founds all the implementing activities and integrates the design and the management processes (Platts *et al*., 1996; Platts, 1994; Platts, 1993). The operating features of an operations strategic management system only could be truly understood, if it is comprehend the process of reviewing the operations system design. The underpinning rationality of the design process addresses the implementation and managing processes. Slack (2000) identifies three main phases in process of redesigning a manufacturing system, which are: the structuring activity, the suppositional activity and the assimilation activity. The structuring activity is used to construct, in social terms, a common sense of the design objectives and options. The design options could be defined in terms of the performance trade-offs within the systems' strategic context. The suppositional activity extends the common language

developed to approach the performance issues in the structuring activity, to a process of creating the scenarios for the design choices. This phase stimulates the debate around the resource capabilities needed and the trade-offs of the designing process. The externalization process developed in the suppositional activity creates the right condition for identifying the knowledge gaps. At this point an assimilation activity is running as a result of a learning process, which was emerging in the suppositional phase and was consolidated in the assimilation phase, when the knowledge gaps are identified. The three interrelated activities could play a special role in integrating the design, the implementation and the management of an operations strategic management system.

Figure 2 shows the interrelated design activities proposed by Slack (2000). They follow the interactive process of knowledge creation proposed by Nonaka and Takeuchi (1995) as they apply the different modes of knowledge creation. The structuring phase socializes and externalizes knowledge, the suppositional activity combines knowledge and the assimilation phase internalizes the produced knowledge. It is important to highlight the importance of the knowledge creation approach in producing sustainable and reinforcing learning processes.



Source: Slack (2000)

Figure 2 – A model of the underlying design activity

The third level of analysis is defined by declaring some theoretical assumptions that will found the theoretical constructions developed in this paper.

It is important to declare some assumptions about performance measurement systems, particularly when they are being studied in the context of an operations strategic management system:

- According to Neely *et al*. (2005) the performance measurement is the process of quantifying the efficiency and effectiveness of action and measurement is the process of quantification. A performance measurement is a metric used to quantify the efficiency and/or effectiveness of an action. A performance measurement system is the set of metrics used to quantify both efficiency and effectiveness of actions. Central to these definitions is that action leads to performance and that there are internal and external factors affect the efficiency and effectiveness of this relationship.
- Mintzberg (1978) arguments that only through a consistent pattern of actions, a strategy could be identified. In fact, the strategy only exists if it is realized. It is assumed that there is interplay between the actions results and the consistency that is established over time and the performance measurement system mediates that interaction.
- The performance measurement systems should be designed, implemented and managed as part of a strategic management system. The measures should be derived from strategy and should provide consistency for decision making and action. Particularly, the production function will be managed in terms of its own strategic management system (Skinner, 1969; Neely *et al*., 2005).

- The strategic management control systems should be used as a means to provide surveillance, motivation, monitoring performance, stimulating learning, sending signals, anticipating events, introducing constraints and managing scenarios to the operations systems. It is important to realize that the control function is being defined exploring the complementary features of mechanic and organic behavior, i.e. reacting and tracking the strategy but also reviewing the system design (Neely *et al*. 2005, Henry, 2006).
- The performance measurement systems should be able to manage the determinants and results of the operations systems outputs, exploring the causalities between them and developing a predictive approach for the whole operations strategic management system (Kaplan and Norton, 1992; Fitzgerald *et al*., 1991; Keegan *et al*., 1989).

The three levels of analysis helped to understand the intended contribution of this work in practice versus theory reconciliation logic of producing knowledge for the OM field (Slack *et al*., 2004), using a process that continuously interplay empirical and theoretical assumptions (Neely, 2005). The practical application was delimited by the operational and management processes described by the rationalities developed by Slack (2000) and Platts (1993), respectively. The third level declares the theoretical assumption that will be used to found the research work.

Defined the approaches to address the main problem described in this paper, it is important to define the elements that configure the operations strategic management

system, particularly in the performance measurement subsystem. This subsystem could be studied in the perspectives of its contents and of its processes.

Content analysis

A strategic performance management system could be defined as a system that uses the performance measurement information to produce a positive change in organizational culture, systems and processes. This positive impact on organizations is achieved by the agreement upon performance goals, the allocation and defining the priorities of resources, informing managers to review or to maintain the current policy or plans to meet these goals, and the sharing of the performance results in the task of pursuing those goals. Implicitly, a role of the performance measurement subsystem is identified in the strategic performance management system contents definition (Amaratunga and Baldry, 2002).

Traditionally, in the contemporary management culture, the organizational performance has a considerable influence on the organizations actions. As a result of this management mental model, the routines and procedures used for the purpose of assess the enterprises performance are perceived as being an important issue in the practioners and academics agenda. There is a common sense that the initial building blocks of all performance measurement initiatives, as they are materialized in a performance measurement system, are performance measurement recommendations. These recommendations basically define the contents and structures of the measures and then

organize them in a framework that could inform the performance measurement system design (Folan and Browne, 2005).

The content definition of the measures, their structure and the subsequent selection and organization of those measures in a framework are strongly linked to utility of the performance measurement system. The focal point is the process of selecting the measures to be included in the system design. A logical framework for the measures selection process could be founded in the competitive dimensions of manufacturing or service operations, as those dimensions are customized and refined for that purpose. There is a common sense that the dimensions categories are organized around the competitive patterns as price (cost/operational efficiency), quality (process and product), time (dependability, and agility), flexibility (process and product) and innovation (process and product). These competitive dimensions could specific transformed in the operations system performance dimensions (Leong *et al.* 1990; Platts, 1995; Slack, 1987; Slack, 1983).

The contents analysis of the role of a performance measurement subsystem that is part of an operations strategic management system is summarized in Table 1.

Table 1 – The structural roles of a strategic performance measurement system

Role	Perspective	Author
To produce a positive change in organisational culture, systems and processes	Strategic performance management system definition	Amaratunga and Baldry (2002) Maskell (1991)
Implement the strategic management functionality in the operations strategic management system	Strategic management function	Band (1990) Globerson (1985)
To develop a continuous improvement capability through the implementation and management of the operations strategic management system	Continuous improvement capability development	Maskell (1991) Maskell (1989)
To provide that the performance management system will cover the long, medium and short term perspectives	Life cycle orientation for performance system design	Blenkinsop and Davis (1991)
The performance measurement system is a result of the measures definitions and performance frameworks recommendations	The systemic and hierarchical approach	Folan and Browne (2005)
The performance measurement system should provide a closer understanding of customer needs	Customer driven strategy	Stalk and Hout (1990) Band (1990) Globerson (1985)
The performance is responsible for articulating strategy and monitoring business results	Strategy realization through the monitoring of the organization's results	Gomes *et al.* (2004) Bhimani (1993) Blenkinsop and Davis (1991) Grady (1991) Santori and Anderson (1987)
The measurement of the business results is implemented using the financial and non-financial aspects of business performance	Financial and non-financial nature of the organization's performance	Gomes *et al.* (2004) Manoochehri (1999) Clarke (1995) Drucker (1990) Maskell (1989) McNair and Mosconi (1987)

Source: elaborated by the authors

The role of the performance measurement system as a part of an operations strategic management system was defined. Now it is important to comprehend those roles in implementing and managing the strategic systems.

Process analysis

There are four main processes related to performance measurement: design, implementation, use and refreshing. The refreshing process could be broadly understood as the continuous system redesign or review (Bourne *et al.*, 2005; Neely *et al.*, 2000; Bourne *et al.*, 2000).

Wisner and Fawcett (1991) propose a nine-step "process" for designing a performance measurement system:

(1) Declare the organization's mission as a clearly unambiguous statement.

(2) Formulate the organization's strategic objectives using the mission statement. It should be stated as interplay between results (*e.g.* profitability, market share) and determinants of the results (*e.g.* quality, cost, flexibility, dependability, and innovation).

(3) Develop a strategic framework to understand the functional area's role in realizing the strategic objectives.

(4) Develop to the functional areas, global performance measures that will present the organization's overall competitive position to senior management.

(5) Communicate the strategy through its objectives and performance goals top-down in the organization. Establish specific performance criteria for each layer of the organization's hierarchy.

(6) Check the coherence and consistency between strategic objectives and the performance criteria used at each level.

(7) Check the coherence of performance measures used in the functional areas.

(8) The performance measurement system should be used to: identify the competitive position; locate problem areas; assist the process of reviewing the strategic objectives and to make decisions regarding the achievement of these objectives; and feedback the strategic system after the decisions are implemented.

(9) The design of the established performance measurement system should be periodically reviewed to assure its fit with the current competitive environment.

The Wisner and Fawcett (1991) process embraces aspects of design, use and refreshing of the performance measurement system, but not address implementation issues. The perspective adopted is strongly linked with the strategy implementation role of the performance measurement system, although it is proposed the periodically system review.

Nine factors are also the number of factors that Franco-Santos and Bourne (2003) seem to have a relevant impact on the way organisations manage through measures:

(1) The organisational culture, stated by a set of beliefs and values, could be grounded in a participative and continuous improvement oriented environment.

(2) The management leadership for managing through measures and the management team commitment to the strategic performance measurement system.

(3) The existence of a compensation link with the strategic performance measurement system (e.g. competence based reward systems).

(4) The development of a continuous and corporative educational process to develop and update the understanding of the measures and the strategic performance measurement system.

(5) The quality of communication and reporting, as they are open, clear, with timeliness and easy to understand.

(6) The continuously review and update of the strategic performance measurement system.

(7) The simplicity of data collection, analysis and interpretation processes, especially used to understand the trends. The support that the IT systems provide for developing the data processes.

(8) The industry and business competitiveness, overall performance, long-term versus short-term focus and government regulations.

(9) A clear and customized strategic performance measurement system framework.

The study of the performance measurement systems implementation success and failure drivers would be helpful to understand the dynamics and structure that found this process. It also be of would be useful for the construction of an operations strategic management system design specification. The performance measurement system is an important part of the strategic management system, as it governs the dynamics of the whole system.

Bourne (2005) organizes the factors that influence the performance measurement system implementation in three main categories that are related to purpose, structure and culture. The purpose analysis shows that there are two main orientations and these could focus on the improving the measurement system or be founded in a more open perspective as managing the business better. The structural studies show the implementation process organization and the relationships that this process has with the

parent company interventions. The cultural dimension shows the importance in developing a learning perspective.

One of the most important factors that drive the implementation of a performance measurement system is senior management commitment. It is important to understand that the priority of the projects undertaken by an organization changes over time and the management team commitment also vary as these priorities change. The relative effort and the availability of management time also help to understand how the implementation of a performance measurement system is overtaken by other events. It is important to highlight that there is a dynamic interaction between projects and their perceived benefits that produces a conflictive demand on time and effort, which could influence the life cycle of the projects (Bourne, 2005).

Bourne (2005) identified some factors that block the performance measurement system implementation process, which are related to:

- the effort required to manage the project;
- the ease of data accessibility through the IT systems;
- the consequences of measurement;
- being overtaken by new parent company initiatives.

The recent literature on performance measurement system is looking for an in deep understanding of why performance measurement initiatives fail (Bourne, 2005; Neely, 2005; McCunn 1998) to improve the understanding of the main role of a performance measurement system, which is in the last instance develops a strategic management system (Henri, 2006; Kaplan and Norton, 1992; Lynch and Cross 1991).

Traditional performance measurement system have been criticized in the literature for the main focus in variation minimization rather than promoting a continuous improvement system (Neely *et al*., 2005; Lynch and Cross, 1991; Johnson and Kaplan, 1987).

The implementation process highlights the importance of the change process enabler of the performance measurement system, especially when related to changes in culture, systems and processes. The continuous improvement role would be played managing the factors that enables and blocks the implementation process.

The factors identified by that Franco-Santos and Bourne (2003) in the process related to the 'use' of the performance measurement system have a direct relationship with the following roles:

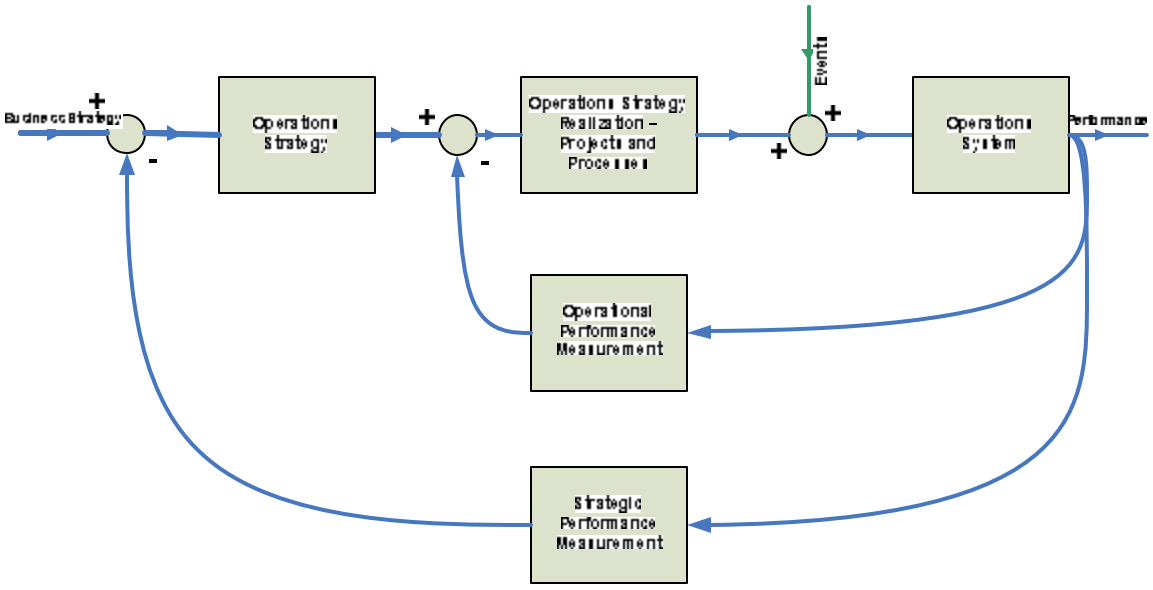
- To produce a positive change in organisational culture, systems and processes.
- To implement the strategic management functionality in the operations strategic management system.
- To develop a continuous improvement capability through the implementation and management of the operations strategic management system.
- To provide that the performance management system will cover the long, medium and short term perspectives.
- The performance measurement system is a result of the measures definitions and performance frameworks recommendations.

Managing through measures could be an approach to develop and implement those roles. The refreshing process could be settled as an embedded functionality of a strategic management system. Its main role is to coordinating the review or the redesign

of the performance measurement system as a result of its use and interaction with its environment. The next section presents the strategic management view of an operation system.

Developing the strategic management view

The developed theoretical construction presented in this section aims to organize and frame the rationality that rules the operations strategic management system - OSMS. The Figure 3 shows the elements that could be seen as subsystems of the OSMS. The 'plant' or the real world system is the operations systems, which is strategically managed by the operations strategy subsystem, the planning subsystem and the performance measurement subsystem. The double feedback loops intends to represent the monitoring (operational feedback loop) and the refreshing (strategic feedback loop) functions.



Source: Pinheiro de Lima and Gouvea da Costa (2006)

Figure 3 – The operations strategic management system

The questions that emerge at this point are: “Why to rely on feedback control systems to strategically manage the operations system?” Isn’t it a retro ceding to the mechanicist view of the organizational systems, denying the continuous changing nature of the strategy and considering the operations systems as a closed system?

The intention of this discussion is to understand the causality links of main elements of a strategic management system that could help the operations system to attend its ‘organic’ role, through the development of the refreshing process. The operations systems and the entire organization would experiment an organic way of conducting their design and operation, integrating in the same system the short and long term perspectives of the operations strategy.

Gomes *et al*. (2004) refines and expands the two phase of evolution model proposed by Ghalayini and Noble (1996), as it is shown in Table 2. The evolution of the performance measurement systems are analyzed in three main dimensions: the systems orientation; the nature of the approach or control logic; and the utility of the system. The evolution is defined by a trajectory that shows the orientation changing from cost through financial to a balanced system. The rationality of the control system changes from a retroactive to a proactive approach. The results that were used to improve the operational efficiency are in the present stages of evolution used to enhance the effectiveness and responsiveness of the overall business.

Table 2 – The evolutionary stages of performance measurement systems

Stages	Transition trigger	Main characteristics and functionalities
Stage I - The closed system		- A cost account orientation - A retroactive approach - Results are used to promote organizational efficiency and to compare actual to the budgeted
	The birth of the systematic large organization	
Stage II – The modified closed system		- A mixed accounting and financial orientation - A retroactive approach - Results are used to promote internal efficiency and attract capital from external entities
	The growth of global business and the changes this growth brought about	
Stage III – The semi-open system		- A mixed financial and non-financial orientation - A mixed retroactive and proactive approach - Results are used to mange the entire organization
	Automated operational phase	
Stage IV – The open system		- A balanced integrated orientation - A more proactive approach - Results are used to enhance organizational responsiveness
	The e-commerce age	
Stage V – Issues for future research		- A system which is designed to monitor the effectiveness of each resource/task (specific measures) and the overall organizational effectiveness (broad measures) - A continuous improvement approach - Results are used to allow the organization to became a first class organization - Top-down versus Bottom-up approach to measurement

Source: adapted from Gomes *et al.* (2004)

The stages of evolution model could be used as life cycle model and the performance measurement system could evolve through it. An analysis could be done to better position the measurement system in the correct stage of evolution, depending on the contingencies that it is submitted. The last stage that proposes some future challenges for the performance systems design and management represents a cumulative process that is based on the retroactive and proactive approaches, oriented to joint improve efficiency and effectiveness.

Conclusion

The presented theoretical constructions in this paper helped to understand the causal links that were established between the strategic performance measurement system and the capabilities that produce the operations system performance.

Continuous improvement, organizational learning and competences development highlights the importance of the resource based view to the design, implementation and management of an operations strategic management system.

Two main roles are related to the strategic performance measurement system, which are the creation of a perceived value for customers; and the joint improvement of the operational efficiency and the overall effectiveness of the business. These aggregated roles could be deployed in more specific ones related to:

- produce a positive change in organizational culture, systems and processes;
- implement the strategic management functionality in the operations strategic management system;
- develop a continuous improvement capability through the implementation and management of the operations strategic management system;
- provide that the performance management system will cover the long, medium and short term perspectives;
- the performance measurement system is a result of the measures definitions and performance frameworks recommendations;
- The performance measurement system should provide a closer understanding of customer needs;

- the performance is responsible for articulating strategy and monitoring business results; and
- the measurement of the business results is implemented using the financial and non-financial aspects of business performance.

Finally, it was shown that these roles are related some organizational capabilities: the organizational learning capability; the continuous improvement capability; the retroactive (closed loop control logic) capability to support the strategy realization; the proactive (predictive control logic) capability to support the operations vision development; and the integration capability to realize the integrated strategic performance measurement system design.

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