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RESEARCH

Forward performance measurement and management integrated frameworks

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Abstract

Purpose – In recent years, performance measurement and management (PMM) has received much attention from researchers and practitioners. Despite the growing use of PMM systems, companies experience difficulty in implementing such systems, with consequent risk of partial benefits or total goal failure. The literature on PMM is quite vast, but only few of the models address the problem in its entirety, while many other works focus on specific issues related to PMM. The purpose of this paper is to analyze the state of the art of PMM models and propose an integrated framework as a base for performance measurement and management design.

Design/methodology/approach – The evolution of the literature on PMM models and frameworks is highlighted starting from the development of the last twenty years. Further, the characteristics raised in the literature are merged so as to identify the milestones of an integrated performance measurement and management system. Based on it, an integrated framework is proposed as a base for a cohesive PMM design.

Findings – The framework integrates five systems: a performance system, a cost system, a capability evaluation system, a benchmarking system and a planning system.

Research limitations/implications – Though the proposed framework is a starting point for performance measurement and management design, it provides important guidelines for successful implementations of PMM initiatives inside companies.

Practical implications – The paper elaborates on the findings in the literature through a review and explores how the framework proposed might be implemented and improved.

Originality/value – The framework is based on the belief that PMM study requires an intensive and deep comprehension of the business in focus, which begins with a complete analysis of all the key activities in the company and their related drivers. Accordingly, the framework proposed starts with a defining "which" information should be analyzed, "how" they should be processed and "how" they should be integrated for generating valuable information to facilitate managers' decision-making processes.

Keywords Performance measurement (quality), Performance management

Paper type Literature review

Introduction

The design of performance measurement and management (PMM) systems is a topic of increasing interest both in the academic and managerial practice areas.

Enterprises need to fix strategies for success, establish goals, execute activities by making proper decisions and monitor their resulting states as the business processes

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move towards their goals. When a firm becomes large enough that a single manager cannot adequately monitor the firm's resultant states alone, the firm must use a PMM system to replace the eyes and ears of the beleaguered manager (Kellen, 2003). Consequently, it is evident today that PMM systems play a crucial role in organizations, by revealing how well the organization is doing with respect to its objectives and pinpointing where improvements are required (Dixon *et al.* 1990).

Despite the large academic and industrial interest in PMM, only a few of the models in the huge extant literature address the problem in its entirety. Mostly, the study involves specific unique PMM issues.

The purpose of this article is to analyze the state of the art of PMM models and propose an integrated framework as a basis for PMM design.

The article has four sections. In the first section, a thorough review of the academic literature is discussed, covering the main systems and frameworks developed in the last 20 years, so as to give a picture of the characteristics of these models. In the second section, the characteristics raised in the literature are merged so as to identify the milestones of an integrated PMM system. In the third section, an integrated PMM framework is developed. The final section focuses on the findings of the literature review and explores how the framework proposed might be improved.

Review of systems and frameworks

The enormously diverse literature on the performance measurement system (PMS) design is shows the importance and the complexity of the topic. While numerous papers debate topics related to the subject, others focus their attention only on a few selected aspects of the PMS design, such us the audit, the design of measures or the review system. Very few address the problem in its entirety.

Through the analysis of over 800 papers published in the selected journals which cover PMM issues, we found twenty models and frameworks providing distinct features that have potential to contribute meaningfully for design of a PMS.

The overall list of distinct models and frameworks is presented in Table I.

In this section we provide a review of these models to outline the research evolution in the last 20 years.

The ROI, ROE, ROCE and derivates

The ROI, ROE, ROCE together with their derivates are some of the financial indicators most commonly used by companies to evaluate the results of their business. The ROI is the single most important measure for investors, since it is a ratio of the profit output of the business as a percentage of financial investment inputs; the ROE adopt instead the perspective of mangers, those entrusted by shareholders to generate profit as a ratio of equity, and the ROCE is a variant which refers to the assets within a manager's direct span of control (Simons, 2000).

The economic value added model

The economic value added model (EVA) was developed by Stern Stewart & Co. to correct a common accounting error by explicitly recognizing that when managers employ capital they must pay for it. By taking all capital costs into account, including the cost of equity, EVA shows the dollar amount of wealth a business has created or destroyed in each reporting period. In other words, EVA purports to define profit the

Name of the model/framework	Period of introduction
The ROI, ROE, ROCE and derivates	Before 1980s
The economic value added model (EVA)	1980
The activity based costing (ABC) – the activity based management (ABM)	1988
The strategic measurement analysis and reporting technique (SMART)	1988
The supportive performance measures (SPA)	1989
The customer value analysis (CVA)	1990
The performance measurement questionnaire (PMQ)	1990
The results and determinants framework (RDF)	1991
The balanced scorecard (BSC)	1992
The service-profit chain (SPC)	1994
The return on quality approach (ROQ)	1995
The Cambridge performance measurement framework (CPMF)	1996
The consistent performance measurement system (CPMS)	1996
The integrated performance measurement system (IPMS)	1997
The comparative business scorecard (CBS)	1998
The integrated performance measurement framework (IPMF)	1998
The business excellence model (BEM)	1999
The dynamic performance measurement system (DPMS)	2000
The action-profit linkage model (APL)	2001
The manufacturing system design decomposition (MSDD)	2001
The performance prism (PP)	2001
The performance planning value chain (PPVC)	2004
The capability economic value of intangible and tangible assets model (CEVITA™)	2004
The performance, development, growth benchmarking system (PDGBS)	2006
The unused capacity decomposition framework (UCDF)	2007

Table I.
List of models and frameworks

way shareholders do it. EVA helps managers incorporate two basic principles of finance into their decision making. The first is that the primary financial objective of any company should be to maximize the wealth of its shareholders. The second is that the value of a company depends on the extent to which investors expect future profits to exceed or fall short of the cost of capital. By definition, a sustained increase in EVA will bring an increase in the market value of a company.

EVA eliminates possible confusion by using a single financial measure that links all decision making with a common focus: How do we improve EVA? By this way, EVA is a financial management system that provides a common language for employees across all operating and staff functions and allows all management decisions to be modeled, monitored, communicated and compensated in a single and consistent way, always in terms of the value added to shareholder investment.

The activity based costing – the activity based management models

The activity based costing (ABC) was introduced to address the shortcomings of typical single driver volume based cost accounting systems. The idea at the base of the model is that all of a company's activities that exist to support the production and delivery of goods and services should be considered product costs (Cooper and Kaplan, 1988). This methodology can lead to radically different evaluations of product costs and profitability than other simplistic approaches. This enables more accurate and responsible strategic decisions regarding product design, pricing, marketing, and mix, and encourages continual operating improvements. The ABC methodology has represented the base for the further development of the activity based management, a framework for PMM based on the monitoring of activities by a cost and process perspective.

The strategic measurement analysis and reporting technique

The strategic measurement analysis and reporting technique (SMART; Cross and Lynch, 1988; McNair *et al.*, 1990) developed by Wang Laboratories is the first attempt of building an "integrated" PMS. The model, also known as the Performance Pyramid, is made up of four levels: at the top of the pyramid is the corporate mission, that is sustained by the lower levels comprised of the strategic business units, the business operating systems and the departments and work centers. The model uses internal and external measures of performance. Objectives are translated down the pyramid, while measures up, so as to link strategies to operations. At the base of the pyramid four leverages are identified: quality, delivery, process time and cost. The model introduces also the interesting idea of "performance loops", that are a system of feedbacks between the various level of the pyramid.

The supportive performance measures

The supportive performance measures (SPA) developed by Keegan *et al.* (1989) is the first model introducing the concept of "balanced" measures. Believing that measures derive from strategy, they developed a pyramid similar to the SMART model, where measures are hierarchical as well as integrated across business functions. The innovativeness of the model is represented by the classification of measures in a balanced matrix that categorizes measures as being "cost" or "non cost", and "external" or "internal", reflecting the need of balance between these dimensions. The authors stress the importance that performance measures must be based on a thorough understanding of cost relationship and cost behavior, and that budgeting and reports should be directly linked to the PMS.

The customer value analysis

The customer value analysis (CVA) developed by Customer Value, Inc. (Customer Value, Inc., 2007) aims to be a PMS exclusively market-driven, by fixing all performance measures around market parameters. Decision making is based on these measures. The model works together with tools, such as value-pricing charts, benchmarking analysis, product attributes-score comparison, priorities chart, etc. The extreme focus on market, the main characteristic of the model, is also a limiting factor.

The performance measurement questionnaire approach

The performance measurement questionnaire (PMQ) was developed by Dixon *et al.* (1990) with the aim of creating a dynamic PMS able to change, continuously, the measures according to environmental changes, strategies, and tactics. The PMQ they developed is a useful tool to assess the status of a performance system, to identify the improvement needs of the organization and identify the necessity of new performance measures. The results of the PMQ are evaluated by a consulting team that carries out a number of analyzes: the "alignment strategy analysis" to verify the alignment of actions and measures versus strategy, the "congruence analysis" to understand the PMS ability to analyze the business, the "consensus analysis" to evaluate the effect of communication and finally the "confusion analysis" to understand the consensus about areas of improvement identified.

The results and determinants framework

The results and determinants framework (RDF) was developed by Fitzgerald *et al.* (1991) as a PMS for the service business industry. The main characteristic of the model is the classification of performance measures in "result measures" such as those related to competitiveness and financial performance, and "determinant measures" such as those related to flexibility, resource utilization, innovation and quality of service. The concept that determinants contribute to results, precedes the more recent concept of "leading" and "lagging" indicators. The model focuses both on external and internal factors, and it integrates both financial and non-financial measures. The model is also supported by a feed forward/feed back control system.

The balanced scorecard

The balanced scorecard (BSC) proposed by Kaplan and Norton has proven to be a successful model of PMM. The BSC proposes a holistic view of the organization by integrating four perspectives of performance: financial, customer, internal business, and innovation and growth (Kaplan and Norton, 1992). The authors assume that the financial perspective (shareholder value) is the final aim of the business, even if they recognize the need to balance with the other three dimensions. The authors stress the importance of identifying the drivers of performance (Kaplan and Norton, 1996) and emphasize company alignment to strategy through the use of performance measures (Kaplan and Norton, 2000). The BSC has also its critics, in particular for the lack of specific guidelines for successful implementation (Pun and White, 2005).

The service-profit chain

The service-profit chain (SPC) was developed by Heskett *et al.* (1994) for the service sector. The model has two milestones: frontline workers and customer that are the center of management concern (Heskett *et al.*, 1994). The authors established a path characterized by cause-effect relations among profitability, customer loyalty, employee satisfaction and productivity. The framework does not offer any specific suggestions for implementation.

The return on quality approach

The return on quality approach (ROQ) was proposed by Rust *et al.* (1995) to aid companies' implementation of their quality efforts. With the belief that quality

initiatives need to justify their investments on financial grounds, the authors propose a framework based on four assumptions: quality is an investment, quality efforts must be financially accountable, it is possible to spend too much on quality and not all quality expenditures are equally valid. The framework also proposes an improvement process and fixes a number of performance measures that have to be monitored.

The Cambridge performance measurement framework

The Cambridge performance measurement framework (CPMF) developed by Neely *et al.* (1996) offers a methodology to implement PMSs. In particular, they propose this process as composed of three main phases: the design of the performance measures, the implementation of the performance measures and the use of performance measures (Neely *et al.*, 1996). It is noticed that the phases mentioned above are conceptual, and that phases can overlap as various individual measures are implemented at different rates. The authors argue that the design of a PMS is a cognitive exercise, and focusing on the importance of business dynamics they present four additional processes to update the PM system over time (Bourne *et al.*, 2000).

Consistent performance measurement system

The consistent performance measurement system (CPMS) proposed by Flapper *et al.* (1996) presents a systematic method for designing a consistent performance management system to be used in practice where explicit attention is paid to the relations among performance indicators (PIs; Flapper *et al.*, 1996). The model, that aims to support management decision-making, consists of three main steps: defining PIs, defining relations among PIs and setting target/ranges of values for PIs. The authors also propose three intrinsic dimensions to classify PIs that are: type of decision supported by the PI, aggregation level of the PI and type of measurement unit used by the PI. Consequently, they propose a new classification scheme for PIs. This work represents a contribution for clarifying the taxonomy of performance measurement, but does not give particular guidelines for successful PIs implementation.

The integrated performance measurement system

The integrated performance measurement system (IPMS) proposed by Bititci *et al.* (1997) argues that the performance management process is a closed loop by which the company manages its performance in line with its corporate and functional strategies and objectives. The framework they developed is composed by five interacting systems, and it is characterized by two important elements: "integrity" and "deployment". The first refers to the ability of the PMS to promote integration among various areas of the business, while the second-one refers to the deployment of business objectives and policies throughout the hierarchical structure of the organization. The model recognizes the importance of the external environment, and it links the different corporate levels using five characteristics perspectives: stakeholders, control measures, environmental positioning, improvement objectives and internal performance measures. An "audit method" is also proposed to assess the integrity and deployment of the PM system.

The comparative business scorecard

The comparative business scorecard (CBS) proposed by Kanji (1998) represents a modification of the BSC proposed by Kaplan and Norton in the direction of the

"business excellence", through the principles of total quality management (Kanji and Moura e Sà, 2002). As the BSC, the CBS applies a holistic view of the organization, by simultaneously looking at four perspectives: stakeholder values, process excellence, organizational learning, delight the stakeholder (Kanji, 1998). The real innovation of this model is the perspective's shift from "customer" to "stakeholders", and from "financials" to "stakeholder value". The model offers insights for defining quantitative relations between the four perspectives.

The integrated performance measurement framework

The integrated performance measurement framework (IPMF) proposed by Medori and Steeple (2000) is one of the few models that give practical guidelines for PMS design and implementation. They utilize non-financial performance measures and develop a framework that proposes six phases for PMS design that are: company success factors definition, performance measurement grid (competitive priorities are: quality, cost, flexibility, time, delivery and future growth), selection of measures, audit, implementation of measures and periodic maintenance. A list of 105 non-financial PIs is proposed in a separate document with clear suggestions for the implementation of measures.

The business excellence model

The business excellence model (BEM) developed by the European Foundation for Quality Management (EFQM) is not designed as a performance measurement framework, but it gives several insights that affect performance measurement. The model is based on nine criteria: leadership, policy and strategy, people, partnerships and resources, processes, customer results, people results, society results and key performance results (EFQM, 2007a). The model is a broad management model that explicitly highlights the enablers of performance improvement and indicates result areas that need to be measured (Neely, 2002). The model proposes an assessment based on the concept of "different organizational maturity stages" (EFQM, 2007b).

The dynamic performance measurement system

The dynamic performance measurement system (DPMS) proposed by Bititci *et al.* (2000) is a modification of the IPMS. Particularly, they explore the characteristics that both the framework and the IT platform should have. Regarding the framework, they identify the need for an external control system, an internal control system, a review mechanism, a deployment system and a number of specific characteristics of the PIs (Bititci *et al.*, 2000). Regarding the IT platform, they identify the following needs: it has to provide an executive information system, it must accommodate all the elements of the framework, it should be integrated within the existing business system, and it should facilitate performance management (Bititci *et al.*, 2000). The model proposed by the authors has a unique characteristic: it proposes a methodology to obtain quantitative cause-effect relations between indicators. This is obtained by using the quantitative model for performance measurement system developed by Suwignjo *et al.* (2000).

The action-profit linkage model

The action-profit linkage model proposed by Epstein and Westbrook (2001) is a framework to identify actions inside a company that affects overall profitability.

Managers should measure the key driver of business success and profit, develop causal links among them and estimate the impact of actions (Epstein and Westbrook, 2001). The framework is structured in four main areas: company actions, delivered product/service, customer actions and economic impact. The studying of action-profit linkage supports managers in their decision making process. The framework proposed is just a starting point for exploring relationships among key performance metrics and therefore it needs to be customized on company business characteristics.

The manufacturing system design decomposition

The manufacturing system design decomposition proposed by Cochran *et al.* (2001) is a tool to design manufacturing systems by making a clear distinction between "objectives" and "means". The purpose of the model is to: clearly separate objectives from the means of achievement, relate low-level activities with high-level goals, understand the interrelationships between the parameters, and communicate this information in the company organization (Cochran *et al.*, 2001). The model considers as final company goal the return on investment, ant it manages the relations among the various indicators by using the principles of the axiomatic design technique (Suh, 1990).

The performance prism

The performance prism (PP) was developed by Neely (2002) in order to reflect the characteristics and address the shortcomings of the frameworks previously developed. The model proposes five interrelated perspectives of performance: stakeholder satisfaction, stakeholder contribution, strategies, processes and capabilities. The set of stakeholders considered by the model are: investors, customers, employees, regulators and suppliers (Neely *et al.*, 2001). The model can be applied in the company integrating both horizontal and hierarchical functions. The authors argue that the framework provides a balanced picture of the business (Neely, 2002) highlighting external (stakeholder) and internal (strategy, process and capability) measures, as well as integrating financial and non-financial measures.

The performance planning value chain

The performance planning value chain proposed by Neely and Jarrar (2004) is not designed as a performance measurement framework, but it gives important insights about how to extract and use relevant data. The model provides a systematic process for using data to enhance decision making, by using a seven-step process: develop hypothesis, gather data, data analysis, interpretation, communication of insights, take informed decisions and plan/take action (Neely and Jarrar, 2004). The model for each step proposes a number of tools to extract value from data and focus efforts on what will add real value to the organization.

The capability economic value of intangible and tangible assets model

The capability economic value of intangible and tangible assets model (CEVITA™) was developed by Ratnatunga *et al.* (2004) for the Australian Department of Defence. The model argues that it is the combination of both tangible and intangible assets that provide an organization a "capability" that ultimately drives its economic value (Ratnatunga *et al.*, 2004). The model proposes a technique to report these tangible and

intangible assets combinations in an organization's financial statements. The model integrates accrual accounting based measures, index based measures and consensus-based measures, cash flow measure and market-based measures.

The performance, development, growth benchmarking system

The performance, development, growth benchmarking system (PDGBS) proposed by St-Pierre and Delisle (2006) is the only model that treats performance measurement exclusively from a benchmarking point of view. The model is focused for small and medium enterprises (SMEs) using a questionnaire as input and a computer process that compares the company data with that of a reference group chosen. Finally, an easy-to-read report is given as output (St-Pierre and Delisle, 2006). Consulting support during and after the application of the system is needed. The work of St-Pierre and Delisle emphasizes the use of benchmarking as an adequate tool to improve SMEs' performances.

The unused capacity decomposition framework

The unused capacity decomposition framework (UCDF) proposed by Balachandran *et al.* (2007) offers a methodology for reporting unused capacity of resources and link it to decision-making. In particular, the framework disaggregates unused capacity cost into categories of unused capacities, such as planned and unplanned unused capacities and thus provides decision-relevant information for management to plan and manage excess capacity. The framework is based upon the prime forces that lead to unused capacity: the uncertainty effect and the adjustment cost effect.

Discussion of PM systems' evolution

The chronological literature review gives a comprehensive survey of the performance measurement research field evolution. The main goal of the models and frameworks analyzed is to support management by helping them to measure business performance, analyze and improve business operational efficiency through better decision-making processes. Most of the models have gone through some empirical testing and some have only theoretical developments (Pun and White, 2005).

In the 1980s, the EVA and the ABC models came as a result of observed deficiencies in the traditional accounting systems. The SMART model, developed in 1988, represents an important change in performance measurement literature, paying attention for the first time in linking strategy to operations, using external and internal measures of performance and modeling the company as an integrated system. The SPA model followed this, by introducing two important innovations that are: the concept of balanced measures and the use of non-financial indicators.

At the beginning of 1990s, the CVA model introduced a completely new approach, by building performance measurement exclusively from a commercial point of view. The use of a single main approach is also utilized by the BEM framework, using quality excellence as focus, and by the PDGBS, using benchmarking as approach.

In the 1990s, many PM systems and frameworks emerged trying to offer integrated solutions (RDF, BSC, SPC, IPMS, CBS, IPMF and BEM) or just specific methodologies to fix certain issues (PMQ, ROQ, CPMF and CPMS). This was followed by the BSC model that encompassed several features such as financial and non-financial to bring out composite measures of performance. The BSC has received much attention in the

last 15 years and it has been applied to several industries successfully. The models and frameworks developed recently possess characteristics of linking strategy to operations, offering balanced set of measures (both financial and non-financial), attempting to create quantitative relations incorporating PIs and addressing performance measurement as a cognitive process.

The models which emerged since 2000 represent further improvement in understanding of the process. The DPMS is notable among these frameworks, since it merges all the strengths of models previously developed, by integrating the use of IT infrastructure and a quantitative model to manage cause-effect relations of PIs. The PP model represents incorporation of an architectural design framework. Among the latest research, the CEVITA™ and the UCDF widen the boundaries of PMM, by paying attention to the growing value of intangible assets and the importance of managing unused capacities. Given the growing importance of managing fixed cost capacities, UCDF is an important step in the literature.

PMM milestones identification

The models presented in the literature present recurrent elements. We map these characteristics and group them to give a common structure. With such a structure we can identify the milestones of an "ideal" traditional PM system, as summarized in Figure 1.

Further work is needed to achieve this ideal system integrating all of these characteristics based on clear definitions of features and providing a successful implementation plan. We explain the system below.

Assessment

PM systems should have an assessment phase to evaluate the capability of the current system, in order to define a base for implementing strategies to rectify identifies

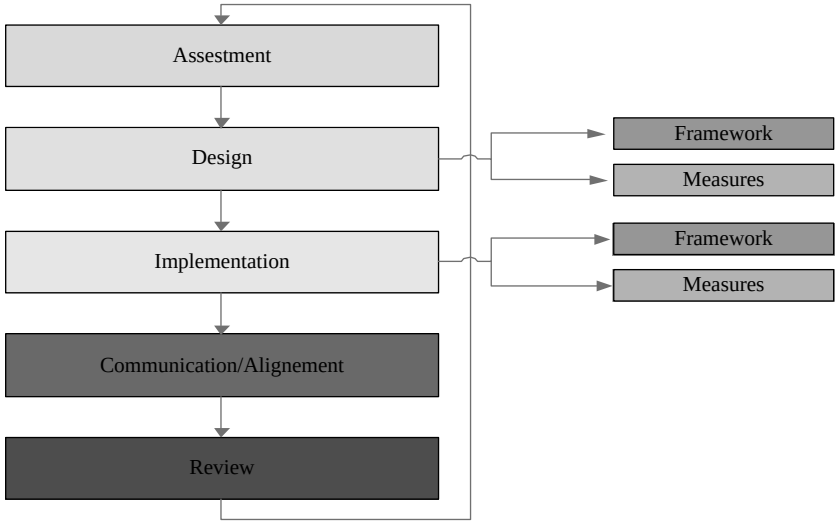

Figure 1.
Milestones of a traditional performance measurement system

deficiencies. This element is very important for the success of a PMM system improvement initiative, since it clarifies at the beginning what the actual PM architecture can offer and delineates the efforts and actions needed in order to improve it. For the assessment aspect, see the methodologies proposed by Dixon *et al.* (1990), Bititci *et al.* (1997, 2000), EFQM (2007a), and St-Pierre and Delisle (2006).

Design

PM systems should incorporate characteristics of the business. Consequently, there is a need to design specific architecture and relevant measures. Several frameworks have been proposed in the literature offering various solutions. Key elements of these frameworks are: the connection of strategies to operations, the consideration of different stakeholder perspectives, the use of financial and non-financial indicators and the integration of external and internal parameters. Franco-Santos and Bourne (2005) identified a number of process factors related to an effective design of a BPM system, they are: performance measurement framework and strategy maps, measures and targets, alignment and integration and the information infrastructure. For the design phase, see the frameworks proposed by Cross and Lynch (1988), Keegan *et al.* (1989), Fitzgerald *et al.* (1991), Kaplan and Norton (1992), Kanji (1998), Bititci *et al.* (2000), Cochran *et al.* (2001), and Neely (2002).

Implementation

Once the framework and measures are designed, guidelines for successful implementation should be clearly constructed. Most of the frameworks developed in the past fail in this aspect. For example, the BSC that proposes a valid and articulated framework for PMM fails to give specific practical guidelines for implementation that can be followed without requiring a trained expert. For an effective implementation of a PMM system, Franco-Santos and Bourne (2005) identified a number of process factors: top manager agreement and commitment, the 3 E's: empower, enable and encourage and finally the communication process. For help in the implementation phase, see Medori and Steeple (2000), Bititci *et al.* (2000), and Flapper *et al.* (1996).

Communication/alignment

PM systems should incorporate guidelines to effectively communicate performances measures and results to personnel inside the company in order to achieve company's goal alignment. Several solutions on this communicational aspect has been proposed such as the use of a single indicator to facilitate common comprehension, the use of dashboards for managers or the use of icons and smiles with employees. Communication is an important driver to achieve company goal alignment to strategy, but is not the only one. There is evidence in fact in literature that PMM systems should facilitate building incentive compensation systems to promote company goal alignment and performance growth. Contributions to this issue can be found in Stewart (2007), Kaplan and Norton (1992), Bititci *et al.* (2000) and St-Pierre and Delisle (2006).

Review

PM systems should have a review system, able to assess both the architecture and measures consequent to environmental or strategy changes. The review system has

therefore the role of preventing any misalignment of the PMM system that is irrelevant to the company business. The review system should also verify if the PMM system contributes to significant improvement in performance (Robson, 2004) that forms the main purpose of any PMM system. For references, see Cross and Lynch (1988), Dixon *et al.* (1990), Neely *et al.* (1996), Medori and Steeple (2000), and Bititci *et al.* (2000).

Forward performance measurement and management-integrated frameworks

In the previous section, the milestones of a "traditional" PMM system were presented.

To create an effective PMM system, it is important to look at the integration of PMM system with other systems in the firm. The need for such integration has been emphasized by Robson (2004).

The interrelationships among the following five systems should be studies and strengthened:

(1) performance system;

(2) cost system;

(3) capability evaluation system;

(4) benchmarking system; and

(5) planning system.

The framework for PMM should be based on a comprehension of the business, which relies first on the analysis of the company activities and their drivers. Therefore, the framework proposed defines "which" information should be analyzed, "how" they should be processed and "how" they could be integrated for generating value information for managers' actions.

The five systems interact in a multi-level way as depicted in Figure 2.

The value chain processes are the input of the three upper systems of analysis. Processes in the firm should be analyzed by defining activities and related drivers so as to provide a comprehensive understanding of the company business. Several companies, particularly small and medium ones, do not have well defined process and activities with drivers and hence, effort should take to identify the company value chain, and all the detailed company processes, activities and related drivers. This work can be time and

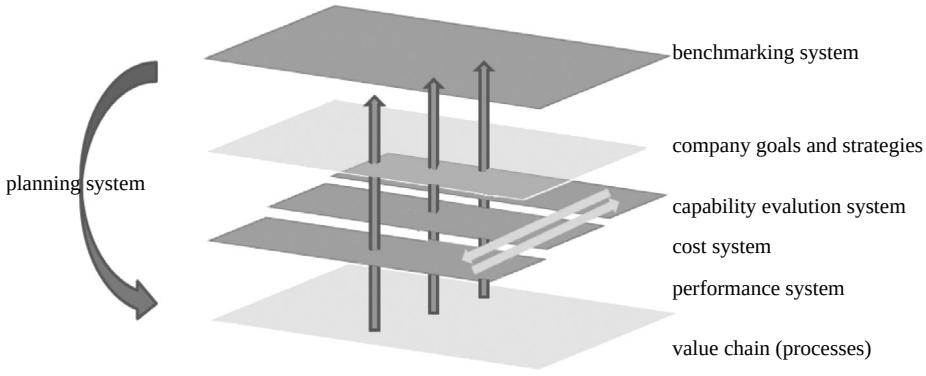

Figure 2.
How the five systems work together in a multi-level way

resource consuming, but the detail achieved in this phase affects the overall PMM system effectiveness. Once processes are identified incorporating such details, they are evaluated by the performance system, which reports the results achieved. The performance system focuses on the measurement of company processes and other particular parameters (key performance indicators, KPIs), which are relevant for the business. Particularly, a good PMS, should not only be limited to a list of KPIs, but should identify relations between them and their level of impact over the business.

In order to understand the information coming from the performance system and make it useful for decision-making, results have to be analyzed in comparison of the "physical capabilities" of the company. By "physical capabilities" the authors mean the reasons that may limit the performance of a specific process (e.g. the production flexibility could be limited by technological aspects or the materials availability could be limited by an inadequate MRP system or the purchasing activity could be limited by human resources).

The comparison between performance and physical capability is particularly important in SMEs, where limited resources can often be the reason for inadequate performances.

In order to support managers in their decision-making processes, at this point the information coming from the cost system is taken in consideration. In fact, the cost system has the key role of providing information regarding process and activity costs which is essential to solve the trade off analysis necessary for the comparison of the performance and capability systems.

The output of this comparison should provide a clear understanding of the process performance, the comprehension of what can be done to optimize the performance and the identification of possible physical constraints that could be removed: however, trade-offs should be made on a cost/revenue-basis.

The information coming from the performance system and from the comparison with the company physical capability should be then evaluated on their congruence with company strategies and goals, so as to ensure alignment of the overall structure. Therefore, performances achieved should be benchmarked with top-performing companies, so as to identify further targets commensurate with company capabilities. Planning is then carried out to achieve new identified goals. The planning activity should not be limited to financial budgeting but extend to non-financial measures budgeting and to business planning.

Conclusions

The framework proposed is a merging of PMM models available in the literature together with the integration of missing elements. It constitutes the base for an effective and implementable PMM system design, by providing guidelines for achieving an integrated approach to PMM.

The majority of PMM models available today limit their focus on the performance system, ignoring its connection to potential effectiveness. By integrating the five systems, an effective integrated PMM system can be built to support management in decision-making processes.

Moreover, the integration process proposed represents a step in moving from performance measurement to performance management.

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