

PERFORMANCE MEASUREMENT SYSTEMS IMPLEMENTATION IN SMALL AND MEDIUM-SIZED ENTERPRISES

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Keywords: Business performance, Performance measurement, Methodology.

Abstract: This paper describes the PMS-IRIS methodology for designing and implementing performance measurement systems in small and medium-sized enterprises (SME). Performance Measurement Systems enable enterprises to evaluate the efficiency and effectiveness of their decisions and operations through a set of indicators related to the vision and strategy of the company. The methodology embraces activities of project planning, strategy design, definition of indicators, process improvement, monitoring, and the design of the computer system required to support the implementation of a performance measurement system.

1 INTRODUCTION

Today, enterprises undergo constant transformations to enable them cope up with a highly dynamic world of economic environment characterised by worldwide scope of markets, increasing customers demands, technological advances, and by the impact on the environment. This new action framework forces enterprises to constantly modify the culture, the way they operate and how they are structured internally in order to compete and survive in this environment.

In this context, one of the tools that enterprises are using to improve their competitiveness is Performance Measurement Systems (PMS) as management methods to measure the efficiency and effectiveness of the decisions they make (Kennerley and Neely, 2002). Effectiveness refers to how skilfully the customer's requirements are resolved. Efficiency is a measure of how economic resources are used to achieve the customer's satisfaction.

A business performance measurement system is a set of metrics for measuring and evaluating the efficiency and effectiveness of business operations that can be used as a support in making suitable decisions to enhance the competitiveness of the firm (Neely et al, 1995). PMS include measures of financial and non-financial performance that vary from one organization to another because they are derived from the firm's strategy, but in any case they

should always provide relevant information for decisions making that enable the enterprise to become more competitive.

Initially, traditional PMS only had cost aspects, today most of PMS include measurements of performance both financial and non-financial aspects such as time, quality, flexibility and efficiency (Chris, 1999).

Since the early 90s different frameworks have been put forward for designing PMS: Strategic Measurement Analysis and Reporting Technique (SMART) (Lynch and Cross, 1991), Results and determinants matrix (Fitzgerald et al., 1991), Performance Measurement Questionnaire (PMQ) (Dixon et al., 1990), Cambridge performance measurement process (Neely et al., 1996), Balanced Scorecard (BSC) (Kaplan and Norton, 1996), Integrated performance measurement framework (Medori, 1998) and Dynamic Performance measurement systems (Bititci et al., 2000).

2 PMS-IRIS METHODOLOGY

The PMS-IRIS methodology is shown in figure 1. It incorporates and adapts aspects of methodologies based on BSC, such as (Ahn, 2001; Lohman et al., 2004), and complements them with useful elements for SME.

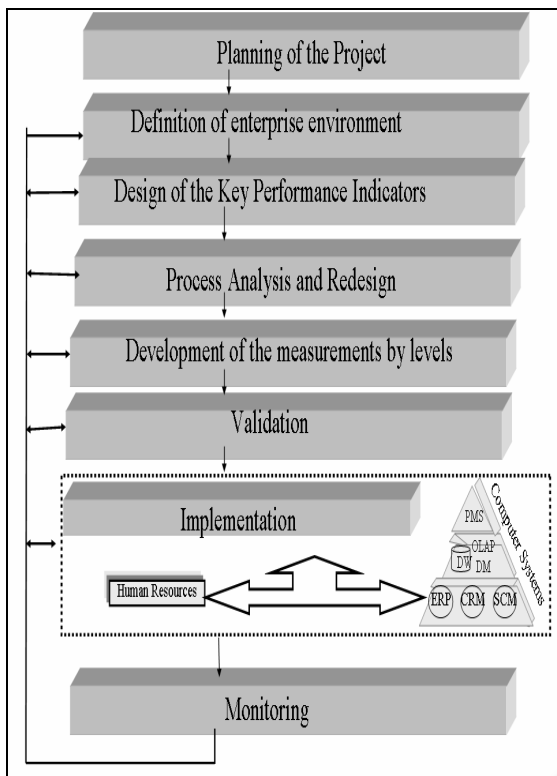


Figure 1: Phases of the PMS-IRIS methodology.

2.1 Planning of the Project

In this phase the organizational unit in which the project is to be applied is identified. The project team includes specialists in finances, human resources, technologies and quality, and members of other areas of the firm. The project plan is created, quality control mechanisms and the plan for change.

2.2 Definition of the Enterprise Environment

This phase focuses on understanding the business in the competitive environment, its internal situation, culture and organizational structure. The aspects at the enterprise level are defined: mission, vision and strategy. The external and internal analysis and the strategy of the organization are used to identify the Critical Success Factors (CSF) for the strategy.

2.3 Design of the Key Performance Indicators at the Strategic level

In this phase the set of Key Performance Indicators (KPI) derived from the strategy for the short-term strategic goals are designed.

The methodology proposes six perspectives:

The financial perspective meets the shareholders' expectations, focused on the creation of value through financial indicators.

The customers perspective identifies the customer segments to compete in reaching the financial objectives. The indicators to be considered are: market share, customers increment, acquisition, satisfaction and profitability.

The processes perspective involves indicators associated with the key processes of the enterprise, to satisfy both shareholders and customers. The indicators are grouped into categories: efficiency, effectiveness, flexibility, time, quality or cost, and must be evaluated in each of the internal processes defined. The processes are divided into two types: 1) Customer-related processes (marketing, sales and postsales), and 2) Support processes, which include supply chain management processes (materials, production and distribution management), human resources and computer system.

The technology perspective includes indicators that express in what technological aspects is necessary to invest to accomplish efficient processes, such as information system technologies and degree of automation process.

The formation perspective includes indicators related to the aspects of learning the human resources, such as degree of satisfaction, retention and productivity.

The corporate social responsibility perspective evaluates the position and image of the enterprise within the competitive environment, such as the number of jobs, health and safety, waste, energy and water usage.

The specification for each indicator includes: identifier, objectives, person who guarantees fulfilment, category, algorithm for calculation, standard value, maximum and minimum value, scale, period of validity, time interval in which it is to be calculated, degree of importance, analysis and interpretation of the result, initiatives for fulfilling the indicator, actions to be followed if it is out of range

2.4 Process Analysis and Redesign

In this phase the processes related to the Critical Success Factors of the strategy for implementing improvements that facilitate the fulfilment of the proposed KPI are redesign.

The first step is to identify the processes and analyze their activities, through a map of processes that describes the current situation (as-is model),

deficiencies and opportunities for improvement are reflected and changes are introduced, thus establishing what processes should be like in the future (to-be model).

The map of processes includes: Name and description; Type of process (support/customer), Inputs and Outputs, Process diagram showing the sequence of activities, Indicators for evaluating the process, Critical Success Factors and Plan of improvements of the process.

Different graphic representation techniques can be used to model the business processes, such as IDEF0 or UML activity diagrams (Chris, 1999).

2.5 Development of the Measurement by Levels

In this phase the objectives and indicators defined at the strategic level are taken for deploying the set of indicators throughout the different business units or processes. The objective here is to adjust the indicators proposed by management to a lower level: the operating level. This way it becomes possible to achieve the commitment of the operating levels and to stimulate the fulfilment of the business strategy with the participation of all members of the SME.

2.6 Validation

In this phase a complete validation of the system of indicators designed with the cause-effect relations is realized. The idea here is to use the results achieved over a period of time to look for a relation among the cause and effect indicators, and to measure the relation among the variables chosen for adjustments to be made to the proposed system. Regression analysis can be used to adjust the indicators.

2.7 Implementation

In this phase the Computer System that aids the PMS is implemented and is integrated to the information system of the enterprise. Training the Human Resources to understand the PMS designed and how to use the computer system is a key element in the success of the project.

2.8 Monitoring

In this phase a set of procedures for keeping track of the PMS are designed. For that the implementation of the PMS is regularly checked and evaluated by monitoring the system in real time and honing it to peak efficiency.

As more results become available, the hypotheses formulated in the strategy can be tested and a process of feedback and ongoing learning is started. Depending on the organizational level (operational, strategic), the strategy is reviewed periodically, readjusting the indicators or undertaking actions to fulfil the goals proposed.

3 COMPUTER SYSTEM

From a practical point of view, a PMS is composed of two elements: a set of key indicators of performance at strategic and operational level and a computer system capable of acquiring data, analysing and communicating them to generate information that is converted into knowledge.

The functional requirements of computer system covers the following aspects:

- Administrative: Provide support for the organizational model. Configure perspectives, indicators and relations of cause and effect
- Monitoring: Implements the monitoring of the strategy in real time with detailed reports.
- Decisional: Take decisions based on the indicators that reflect the internal and external situation for the objectives to be prioritised.
- Alert: Provide a system of warning signals when indicators are beyond limits.
- General: Generate reports and graphic representations about the objectives.
- Human Resources: Analyse the performance of each member who is assigned objectives.
- Technology: Facilitate mechanisms of interoperability between the business-employee. Integrate with the existing computer systems

The computer solution is defined as a system of integrated components that combines different technologies. ERP provide part of the information that is required by the PMS to evaluate the indicators. Integration of the PMS computer system with the ERP is an important factor for the success of the project (Rom and Rohde, 1996). Like other business intelligence technologies they are capable of automating, informing or transforming the organization (Chand et al., 2005).

The solution consists in storing the information in a Data Warehouse (DW) that is set up following a process involving the integration of data in specific business systems: ERP, CRM, SCM, which are a mixture of operational and decisional systems. The system uses the data integrated in the DW to generate models for the analysis of the organization

with data-mining tools. The system also includes On-Line Analytical Processing (OLAP) techniques that make it possible to carry out complex analyses of the information contained in the DW.

4 DISCUSSION

The main contributions made by the PMS-IRIS methodology is the improvement of the different existing frameworks, by including aspects that had been successfully applied in the field of enterprise integration (Chalmeta et al, 2001).

Applying the PMS-IRIS methodology to 22 SMEs, the following aspects were confirmed: 1) Staff need to be trained in performance evaluation, 2) Although they have some operational computer systems, their results are not used to formulate long-term objectives, 3) To ensure the successful implementation of a PMS an organizational culture and capacity must exist within the enterprises to process and interpret information.

5 CONCLUSIONS

Designing a PMS requires careful preparation, perseverance and the conviction of management. The application of the PMS-IRIS methodology will produce changes in the SME, enabling them: Define, evaluate and update their strategy, Regular reviews of objectives accomplishment; Support decision making, Increase communication capabilities, Have access to more detailed information for drawing up the strategy, Deploy the strategy to the operative levels; Incorporate continuous process improvement, Emphasize the need to utilise information technology at process level as support for strategy management, Improve strategy communication for all members of the organization.

ACKNOWLEDGEMENTS

This project has been founded by CICYT DPI2006-14708

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