

PERFORMANCE MEASUREMENT SYSTEM (PMS) INTEGRATION INTO NEW PRODUCT INNOVATION: A LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Ana Isabel Jiménez-Zarco
Open University of Catalonia

María Pilar Martínez-Ruiz
University of Valencia

Óscar González-Benito
University of Salamanca

Ana Isabel Jimenez-Zarco is Associate Professor, Department of Marketing, Open University of Catalonia, Barcelona, Avinguda del Tibidabo, 39-43, Spain, (+34) 93 2542110, (+34) 934 176 495 (fax), ajimenez@uoc.edu. Maria Pilar Martinez-Ruiz is Visiting Professor, Department of Marketing, University of Valencia, Facultad de Economia de Valencia, Avenida de los Naranjos, s/n, 46022, (+34) 96 382 83 34, (+34) 96 382 83 33 (fax), m.pilar.martinez-ruiz@uv.es. Óscar González-Benito is Professor, Department of Marketing, University of Salamanca, Salamanca, Campus Miguel de Unamuno. 37007, Spain, (+34) 923 294 400, (+34) 923 295 715 (fax) oscargb@usal.es. The authors also wish to extend thanks to the editor and the anonymous reviewers for their constructive comments and suggestions. This manuscript was accepted by Pierre McDonough, the European regional editor of the AMS REVIEW.

EXECUTIVE SUMMARY

In the past, researchers have long shown increasing interest in the study of new product innovation activities. A large body of research has been devoted to the study of this subject, providing useful insights as well as relevant theoretical and managerial implications. Within this research line, the identification of key activities and practices regarding new product success constitutes an especially relevant objective. On the one hand, previous literature has widely investigated organizational clues and key processes involved in successful new product development and launching. On the other hand, previous contributions have also approached the measurement, evaluation and control of new product performance and success. However, little attention has been paid to the implementation of a complete performance measurement system (PMS) that would cover the whole new product development (NPD) process.

Few works have analyzed NPD processes under the PMS perspective. Nevertheless, the model proposed by Cooper (1990) establishes the main guidelines for developing such an analysis. This model presents the product innovation process as a complex system that consists of two independent and parallel processes: the development process itself and the evaluation process. However, the configuration of a complete PMS with potential applications to any of the stages involved in NPD has been little addressed. Research contributions during the past two decades have focused exclusively on the examination of financial figures. However, these proposals are insufficient because they obviate other multiple performance dimensions that determine sustainable success in product innovation.

The *Balanced Scorecard* (BSC) approach, developed initially by Kaplan and Norton and used extensively by other researchers, has been shown to be an effective system that provides a full evaluation of performance by combining different perspectives and measures. Its application to product innovation is promising for decision-making. The BSC establishes the conceptual basis for obtaining a full integration of a PMS into the NPD process. However, the adaptation of the BSC to a product innovation process is complex and hard to implement. Previous attempts to put into practice the multidimensional conception of performance and to develop appropriate and available indicators have run into difficulty since they have considered incomplete information or have eluded critical information relating to the decision-making process.

In this respect, this paper proposes an adaptation of the BSC to the innovation process. This objective involves translating the usual performance dimensions into operative indicators as well as proposing new performance dimensions and indicators overlooked in previous research. In short, the proposal attempts to build a system that allows us to: (1) measure quality and performance throughout the NPD process and (2) detect those factors that condition the final and sustainable success of product innovation.

Keywords: New Product Innovation, Performance Measurement System, Balanced Scorecard

PERFORMANCE MEASUREMENT SYSTEM (PMS) INTEGRATION INTO NEW PRODUCT INNOVATION: A LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Several studies have highlighted the importance that measurement and control systems have on new product development process performance (Atuahene-Gima 1996; Cooper and Edgett 1996; Cooper and Kleinschmidt 1995; Cooper et al. 1994; Edgett and Parkinson 1994; Griffin 1997; Hart et al. 2003; Johne and Storey 1998; Neely et al. 1997, 2000; Oldenboom and Abratt 2000; Pawar and Driva 1999;). In spite of this fact, there is no clear consensus regarding the model of measurement that should be used, or even the determinant success innovation dimensions that should be considered (Brignall and Ballantine 1996; de Brentani 1995, 2001; Kaplan and Norton 1996 a, b, 2001; Srivastava, et al., 1999; Storey and Easingwood 1996, 1998; Storey and Kelly 2001; Woodcock, 2000).

The New Product Development Process

Cooper (1990) developed the most reputable model to structure the product innovation process in the early 90s. Based on Booz, Allen and Hamilton's model (BAH), the Stage-Gate System (SGS) is both a conceptual and an operational model intended to move a new product from the idea stage through to market launch and beyond. Thus, this model constitutes a blueprint for improving both the effectiveness and the efficiency of new product management (Cooper 1990, 1994b, 1996).

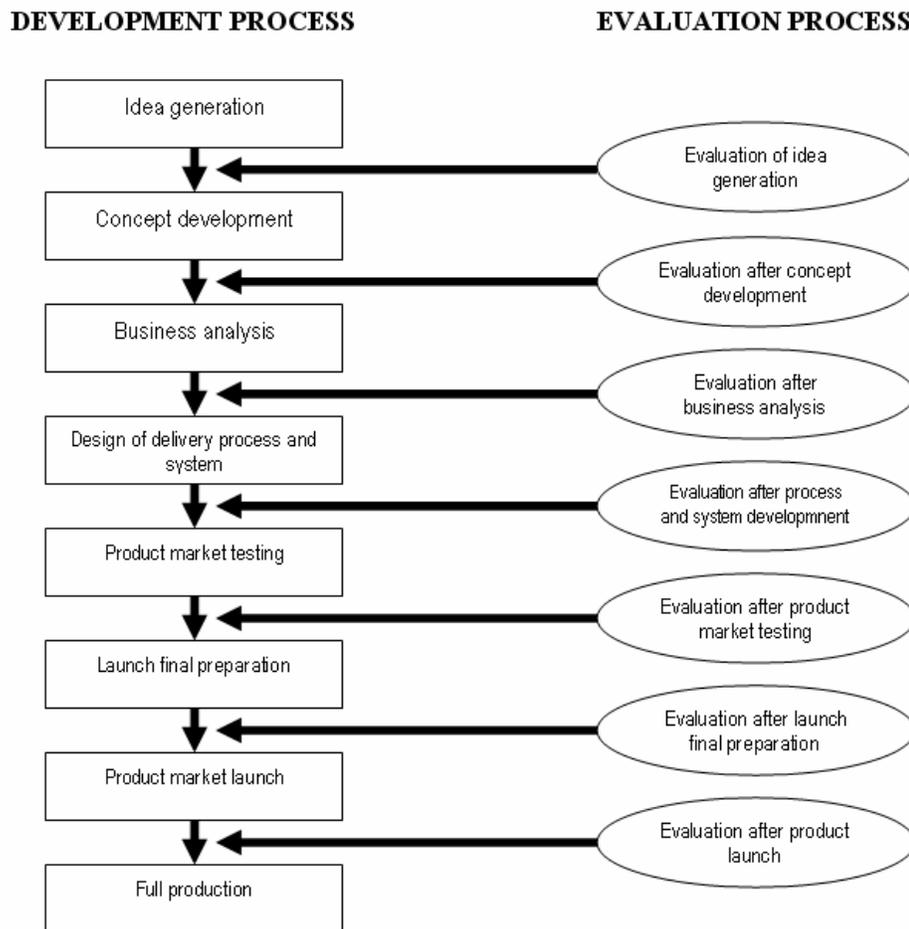
From an SGS point of view, innovation arises from a double process: the development process and the control process. The development process consists of a predetermined set of stages. Between each stage, there is a quality control checkpoint or gate. All the gates together constitute the control process. A set of unspecified deliverables for each gate determines a set of quality criteria that the product must pass before moving to the next stage (Cooper 1996). Also, flexibility is built in to promote acceleration of projects. In order to reduce time to market, stages can overlap each other; long lead time activities can be brought forward from one stage to an earlier one; projects can be moved into the next stage, even though the previous stage has not been totally completed; and stages can be collapsed and combined (Cooper and Kleinschmidt 1995).

Usually the development process involves from four to eight stages and gates (see Figure 1). Each step consists of prescribed, multifunctional and parallel activities (Cooper and Kleinschmidt 1995), undertaken by people from different functional areas, but working together within the team and guided under a single director (Cooper 1996). Despite this general model, the sector in which the company competes determines the way the new product process is developed and the importance given to every stage. On the one hand, some stages are regarded as more important than others, that is to say, some stages should be developed more carefully if the company aims to achieve the success of the new product. Among these stages it is possible to mention: proficiency in predevelopment activities (Atuahene-Gima 1996; Cooper and Kleinschmidt 1995); quality of execution of marketing activities (Storey and Easingwood 1996); sharp and early product definition (Cooper 1994 a,b; Cooper and Kleinschmidt 1995); and launch effectiveness (Edgett 1994; Edgett and Parkinson 1994; Odelboom and Abratt 2000).

On the other hand, the control process is formalized through different gates. These gates are the entrance to each stage, as a checkpoint for a go or kill decision. They are the points where the path forward for the next play or gate of the process is decided, along with resources commitments. Gate meetings are usually staffed by senior managers from different functions, who own the resources required by the team for the next stage. Each gate is characterized by a set of inputs, a set of exit criteria, and outputs (Cooper and Kleinschmidt 1993). Inputs are the deliverables to a gate review, what the team delivers to the meeting. They are the results of the actions of the previous stage and are based on a standard menu of deliverables of each stage. The criteria are questions on which the project is judged in order to make the go/kill and prioritisation decision, and include qualitative and

quantitative criteria. Finally, outputs are the results for the gate review, the decision at the gate, typically a go/kill/hold/recycle decision, and the approval of an action plan for the next stage (Cooper 1996).

FIGURE 1
Activities That Comprise the Development and Evaluation Processes



Source: Cooper (1990)

Nowadays the literature recognizes the importance of a suitable and thorough control process for new product success (Kaplan and Norton 1993). However, little work has been done to provide a complete control system to measure how a company's objectives are achieved during the different stages of the new creation process, in order to evaluate NPD performance and enhance its success (Pawar and Driva, 1999). The following framework will be developed with this main goal in mind.

A Review of Performance Measurement Systems: The Balanced Scorecard

Performance measurement may be defined as: "the periodic measurement of progress towards explicit short and long-run objectives and the reporting of the results to decision makers in order to attempt to improve program performance" (Cook et al. 1995). Historically, Performance Measurement Systems (PMS), have been developed as a means of monitoring and maintaining organizational control in order to ensure that the proposed strategies are suitable to the proposed objectives (Neely et al., 1997). Thus, companies implement a PMS because it: (1) provides quality information for decision makers, so that they can determine whether their efforts are on course;

(2) helps managers understand when their programs are succeeding or failing, by signalling potential manager problems when the performance indicators are not able to track in the desired function; (3) encourages managers to take initiatives and be accountable; and (4) clarifies the process for the expectations and requirements of policy makers.

PMS have been widely used in the marketing field. However, traditionally marketing performance measurement has been focused exclusively on the achievement of a limited number of key financial measures, based on the information provided by the accounting department, and derived from balance sheets and income statements (Crosby and Johnson 2001; Neely et al. 2000). This has been one of the main reasons why several studies have highlighted increasing dissatisfaction with these traditional forms of performance measurement (Brignall and Ballantine 1996; Ghalayni and Noble 1996). Much of the criticism stems from: (1) their short term orientation (Dekimpe and Hanssens 1999); (2) their limited diagnostic power (Day and Wensley, 1988); (3) the lack of agreement in relation to the nature and number of measures that need to be used, and the subsequent difficulty for making comparisons between companies (Clark, 1999); and specially (4) their failure to measure and monitor multiple dimensions of companies' performance (Eccles 1991). Certainly, the use of financial measurements reflects the traditional emphasis on the accounting and financial aspects of company work, eluding other internal and external dimensions that are also important for adapting the company to the new competitive environment.

Success must be considered as a multidimensional concept that varies over time and according to the firm analyzed and sector to which it belongs (Brignall and Ballantine 1996). Furthermore, success is highly influenced by other elements, such as the market, the customer or the learning ability of the firm. Hence, throughout the 1980s and 90s, different approaches emerged that recommended the use of measurements such as market share or customer orientation as indicators of profit or market success (Blattberg and Thomas 2001; Rust et al. 2000; 2003).

A wide variety of studies has proven the importance of non-financial measures such as customer satisfaction (Szymasky and Henard 2001), customer loyalty (Gurviev 1997), brand equity (Keller 1998) and human capital (Srivastava et al. 1998) as indicators of the degree of profitability and competitiveness. Therefore, interest in the analysis of intangible assets has increased considerably, and the development of PMS systems in which measurements regarding these assets are present is now frequently seen

Additionally, the complexity of the environment in which firms operate induces a great challenge: the development of integrated systems that include different types of measurements –both financial and non-financial–and which at the same time consider the different dimensions having an impact on the market success of firms in the end markets (Waggoner et al. 1999; Yenyurt 2003). For this reason, throughout the past two decades different methods have been developed, and we can mention –among others –the Strategic Measurement Analysis and Reporting Technique system (SMART system) developed by Wang Laboratories, Inc., and the Performance Measurement Questionnaire (PMQ), developed by Dixon, Nanni and Vollman in 1990.

One of the most important new PMS is the Balanced Scorecard (BSC) proposed by Kaplan and Norton in the early 1990s. As a pioneering approach, this model has served as a basis for the development of subsequent approaches such as those of Edvinsson (2002), Ittner et al. (2000), Lev (2002) and Sandvik (2004). This approach recognizes the weaknesses and vagueness of previous management approaches, and provides a clear description of what companies should measure in order to balance the financial perspective.

This system enables organizations to clarify their vision and strategy and translate them into action. Giving top managers a fast but comprehensive view of the business, the BSC provides feedback on both the internal strategy process and external outcomes in order to continuously improve strategic performance and results (Kaplan and Norton 1992, 1996 a, b, 2001; Neely et al. 2000). Thus, much more than a measurement exercise, the BSC is a management system that can motivate breakthrough improvements in such critical strategic areas.

The BSC suggests that companies can be viewed from different perspectives. Presenting a balanced set of measures, the system makes sure that one dimension of performance-or a set of them- is not stressed to the detriment of others. It includes financial measurements that reveal the results of the actions already taken, but at the same time, it complements the financial indicators with other non-financial measurements such as: performance for customers, internal processes and innovation and improvement activities. The information from different perspectives provides balance between external and internal measurements, allowing managers to look at the business from four important perspectives: financial, customer, business processes and learning and growth (Kaplan and Norton 1992, 1993, 1996 a,b). Another interesting point is that the system combines soft and hard measures, although the emphasis is centred on the latter ones. This has led several firms to question its usefulness (Olve et al. 1998; Guthrie et al. 1999).

THE BALANCED SCORECARD APPROACH APPLIED TO A NEW PRODUCT DEVELOPMENT PROCESS

The BSC has been widely applied (Sveiby 1997), since it minimizes information overload by limiting the number of measurements used, forcing managers to focus on the handful of measurements that are most critical (Kaplan and Norton 1992). This balanced set of measurements both reveals the trade-offs that managers have already made among performance measurements and encourages them to achieve their goals in the future without making any trade-offs among key success factors. Nevertheless, different market situations, product strategies and competitive environments require different scorecards. Thus, the adaptation to each company and situation must be the focal point of the organization's efforts, and the managers must articulate the strategy of the business, communicate the strategy of the business and help align individual, organizational, and cross-departmental initiatives in order to achieve a common goal (Kaplan and Norton 1996 a,b, 2001).

Authors such as Bean and Radford (2001) propose the use of the BSC as a measurement and control tool in the development processes of new products. Despite the great usefulness of this tool (Storey and Kelly 2001), the diversity of factors that condition the success of the innovation process and its market performance means that systems should also consider:

- New measurements, both financial and non-financial.
- New dimensions influencing the success of the innovation process as well as the success of the product launch.

Regarding these issues, some researchers suggest that if there are different types of new product performance outcomes to be achieved, the use of evaluation criteria related to the performance dimensions would be an appropriate means of steering the new development process through to go/no go evaluation gates (Hart et al. 2003). To analyse success in different dimensions, the new product literature recognizes the incorporation of new indicators to the analysis dimensions previously proposed by the BSC as well as the generation of four new dimension groups complementary to the previous ones

Traditionally, the four main perspectives of the scorecard permit a balance between short-term and long-term objectives, between desired outcomes and the performance drives of those outcomes, and between hard objective measures and softer more subjective measures (Kaplan and Norton 1996 a). These are financial, customer, company and learning/growth perspectives. While the multiplicity of measurements on a scorecard system can sometimes be seen as confusing, properly constructed scorecards contain a unity of purpose since all the measurements are directed toward achieving an integrated strategy.

The BSC includes financial measurements that reveal the results of the actions already taken. Some of them are not useful for evaluating the contribution of a new product to the company's performance. However, contemporary reviews of performance research observed that financially-based criteria are often the most

frequently used measurements of new product success. For this reason, with the financial indicators considered in the model, it is necessary to include other indicators in order to evaluate whether the company's innovation strategy, implementation and execution are contributing to bottom-line improvement (Neely 1998; Neely et al. 2000). Typical innovative financial goals have to do with profitability, growth and shareholder value. Even though the primary aim in launching a new product is to return a profit to the firm in the long run, short term profitability criteria continue to be the most frequently used measurements of performance in studies of new product success (Storey and Kelly 2001). At the same time, survival can be measured by cash flow, success by quarterly sales growth, and operating income by division, and prosperity by increased market share by segment and return on quality. Nevertheless, other financial measurements that should be taken in this evaluation are: shareholder benefits, profit-margin, payback period, cost and development/investment costs, risk assessment and cost-benefit data (Storey and Kelly 2001).

Considering customer-based measurements, many companies today have a corporate mission that focuses on the customer. "To be number one in delivering value to customers" is a typical mission statement (Grönroos 2000), and how a company is performing from its customers' perspective has become, therefore, a priority for top managements (Berry et al. 2002). The BSC demands that managers translate their general mission statement on customer products into specific measurements that reflect the factors that really matter to customers. In general, customers' concerns tend to fall into four categories: time, quality, performance, and cost (Kaplan and Norton 1996). Thus, customer-based measurements of new product performance have to include customer acceptance and satisfaction, perceived product quality, customer acquisition and customer retention. Storey and Kelly (2001), based on Sampson's (1970) work, define success from the customer point of view as a new product which: (1) satisfies new needs, wants or desires; (2) shows outstanding performance compared to other products, and (3) benefits from an imaginative combination of product and communication. Moreover, authors such as Grönroos (2000) and Gurvierz (1997) suggest that customer loyalty criteria as well as perceptions of the superiority of the product in terms of added value, quality or brand image should be considered among the customer-based criteria.

While financial- and customer-based measurements of performance of a new product represent performance in the marketplace, the company-based criteria measure product innovation process performance internally. The internal measurements proposed for the BSC should stem from the business process. In particular, the development costs, the development speed and the effectiveness of marketing and technological fit have to be considered, among others (Storey and Kelly 2001). Companies should also attempt to identify and measure their core competences, the critical technologies needed to ensure continued market leadership. They should decide what process and competencies they must excel at and specify measurements for these processes and competencies (Kaplan and Norton 1992).

Nevertheless, regarding the company-based criteria, Jaworski and Kolhi (1994), Kahn, (1996, 2001), Tuoninen and Möller (1997), and Slater and Narver (1994, 1995), among others, consider the importance of the organizational culture on the success of the innovation process developed by firms. Nowadays, nobody disputes the relevance of the degree of market orientation, customer orientation, learning, innovation or quality in the definition of strategies and policies by firms. Therefore, it is necessary to incorporate certain indicators relating to: (1) the degree of market orientation, and consequently, the degree of customer orientation; (2) the level of quality offered to the customer; (3) orientation towards innovation and the ability to anticipate the needs and preferences existing in the market. Some of the proposed measurements within this research field are: to know the extent to which the company uses its personnel in order to learn about the needs and preferences of customers and to develop market research processes; the existence of communication and collaboration relationships with the customer that can be useful in the conception and development of new products (Odelboom and Abratt; 2000; Storey and Easingwood, 1998).

On the other hand, the level of interfunctional coordination is a key factor regarded in the marketing literature as determinant of success in new products development (Kahn 1996; 2001). Therefore, the inclusion of criteria relating to the extent of internal and external cooperation would be of great interest in order to measure the degree

of interfunctional coordination or even to establish the existence of a high degree of integration of external agents in the organization structure. Finally, the degree to which the organization processes and actions are oriented to the transmission and diffusion of information to top management is also considered.

Finally, regarding learning and growth, it should be mentioned that it is equally important to measure performance at the program as well as at the project level. A single successful project does not imply that the firm is good at new product development. Although comprising the same category of performance measurements as found at the project level, program level measurements evaluate the success of the firm over more than one new product (Storey and Kelly 2001). These measurements should indicate the extent to which the product firm has learned from the successes and failures of individual projects, and has incorporated the learning to develop process into an organisational capability offering true competitive advantage in the marketplace. Measurements used at the program level include the percentage of successful new product launches; sales or profits from recent new products; average development cost per product; the number of new product launches; the number of projects killed prior to launch; and the number of design awards. Furthermore, it is important that the firm develop internal and external cooperation during the innovation processes, which will influence not only market innovation success but also the firm's ability to acquire new knowledge and skills. Innovation is a learning process itself, where the knowledge is both an input and an output. (Vilaseca and Torrent, 2003). Thus, with the previously mentioned indicators, it is possible to consider measurements related to actions of communication and cooperation with suppliers, distributors and competitors, the degree of customer participation in the innovation process and the type of information and knowledge that is exchanged during these processes.

Different studies provide evidence on the wide use of all these performance indicators by companies (Griffin and Page 1993, 1996; Storey and Easingwood 1998, 1999; Storey and Kelly 2001). These measurements facilitate the performance evaluation of new projects as well as the possibility of having indicators concerning the presence of certain key determinant factors of product innovation success. Profit and financial indicators are by far the most frequently quoted measurements of performance, although customer-based measurements are more employed in product firms. Specifically, measurements of customer satisfaction or a firm's ability to attract new customers and retain existing customers are used extensively by product companies.

Nevertheless, other works consider that as part of these last performance indicators it is necessary to value other dimensions regarded as key in the success of the innovation process as well as in the new product launch (Avlonitis et al. 2001; Griffin and Page 1993, 1996). Among them, it is possible to consider market-based criteria, product-based criteria, marketing-based criteria, and competition-based criteria (Easingwood and Percival 1990; Storey and Easingwood 1999).

Regarding the market factors, there is an essential aspect that should be considered and valued when establishing the success possibilities of a new product market launch: market potential. Market potential is defined by the level of the market's growth and size (de Brentani and Ragot, 1996), the company market position, the level of customer loyalty and satisfaction with existing brands, the degree of familiarity with the product class and the lack of competition in the marketplace (Cooper et al. 1994; Storey and Easingwood, 1996). As another determinant of the new product's success, this factor is used in most strategy models to allocate resources to new and existing businesses or products (Cooper and Kleinschmidt, 1995). Nevertheless, authors such as de Brentani and Cooper (1992) consider its effects outside of the success formula when this factor is taken along with other factors in the services sector. One reason this occurs is that large and growing markets may not be as important to services as they are to physical products since development costs are often lower and fewer customers are needed to ensure success. Another reason argued by these and other authors is that service firms have learnt to cope with intensive market competition given the relative ease with which new services are imitated by competitors (Athuane-Gima, 1996, Cooper and de Brentani, 1991).

In parallel to the market attractiveness research, the current competition and its operation and reaction ability towards the firm's actions should be contemplated. For this reason, the PMS should also include a new dimension

determinant of a firm's success: competition-based criteria. The firm's ability to offer a product adapted to customer requirements, giving high value, provides a certain guarantee of market success. However, the probability of success can be undermined if the product is not launched at the appropriate time, or the product offers an inferior level of quality with respect to competitors (Hart et al. 2003). Hence, in order to estimate the success capability of the innovation process as well as its market performance, it is necessary to use indicators that evaluate capacity for reaction of the competition, the degree of marketing orientation of the competition, the quality of the competitors' products, and the image of competitors' products (Storey and Easingwood, 1999)

Another set of factors that should be taken into account are the product characteristics, which include the product advantage, product-company synergy, and product-market synergy. The marketing literature supports the idea that the product advantage is one of the most successful factors in the new product development process. The product advantage refers to the differential benefits that customers get from the company as the outcome of the innovation process (Athuane-Gima, 1995). Products that deliver a superior service outcome are competitive products, offer unique customer benefits, provide faster, more efficient and more reliable services, have a higher quality image, offer better value and are usually more successful. Though some experts have argued that this kind of opportunity is not easy to achieve for service products, other researchers have not supported this idea (de Brentani and Cooper, 1992).

Furthermore, product-company synergy constitutes a strong predictor of success. This construct is related to the degree to which the resources required to develop market innovations fit the firm skills. In other words, this factor involves the firm's ability to benefit from its existing delivery systems, human resources, sales, market research system and managerial skills (Athuane-Gima, 1995, Oldelboom and Abratt, 2000). This fit can be the result of several elements: financial resources, marketing expertise, marketing resources, delivery systems, technology systems, product assortment, management expertise, market research expertise, and so forth (Storey and Easingwood, 1996). More specifically, the literature recognizes two main types of service-company synergy: first, the innovation-market synergy, and second, the innovation-technology synergy (Athuane-Gima, 1996). Whereas innovation-marketing synergy indicates whether the new service can take advantage of the current marketing skills and resources (e.g. sales force, distribution, advertising, promotion, market research and customer service/delivery), innovation-technology synergy suggests whether the new service can make use of the current technological skills and resources (e.g. production and engineering).

Furthermore, another aspect to be considered is the degree of suitability of the new product to the market. This factor defines the degree to which the new product meets the customer's needs, wants and requirements (de Brentani and Cooper, 1992). Products with a high product-market fit satisfied and identified customer needs clearly, responded to important changes in customer needs or wants and were consistent with customers' value and operating systems (Cooper and de Brentani, 1991). A strong market orientation is a fundamental factor that helps achieve a service-market fit. A good knowledge of the customer and the development of a customer orientation make it easy to develop a strong company-customer relationship. In this type of relationship new services can be adapted to customer needs and wants more precisely.

Finally, the last dimension to be considered includes the evaluation of the marketing factors. Marketing factors involve the marketing strategy employed, people's knowledge, distribution channel support and the operations management system (Storey and Easingwood, 1998). Other works also incorporate into this classification the firm's marketing capability, front-line personnel, market analysis resources and ability to communicate with customers (de Brentani and Ragot, 1996). Easingwood and Storey (1991) suggest that communication strategy and intermediary support should be considered the most important aspects of the marketing strategy. On the one hand, this type of communication has a great impact on the success of services, not only because it lets customers participate in the development processes but also because the company can communicate the benefits of the services through these processes (de Brentani and Ragot, 1996). This factor can also be considered essential as it can create a special image for new services, thus influencing the company's reputation (Easingwood and Storey, 1991; Storey and Easingwood, 1996, 1998, 1999). On the other hand, the intermediary support also has a great

impact on the success of services. Companies can use intermediary networks as vehicles to exert direct or indirect control over the service creation and delivery system (Easingwood and Storey, 1991).

THE USE OF THE BALANCED SCORECARD AS A NEW PRODUCT INNOVATION GATE

The inclusion of new indicators and dimensions of analysis within the BSC enables it to be used as a suitable valid measurement system for controlling the development of new products. Under this new proposal the measurement system provides a broad view of the organization's situation as well as the new, recently developed project. Though these measurement indicators proposed can generally be applied in certain circumstances, the measurement system provides information relating to the seven different dimensions that characterize the extent to which a new product has performed. Table 1 shows the analysis perspectives and some of the criteria proposed.

Hart et al. (2003) point out the need to use different control criteria for each stage comprising the process of new product development. It was thus shown that some criteria are much more frequently used in the early gates of the new product development process, while others are used more in the later gates. Moreover, while some criteria are often used in only one or two of the control gates, others are used in at least three control gates.

Regarding these premises, Table 2 presents the different indicators that make up the BSC. These indicators can be used as gates in each stage of the development process, considering the structure proposed by Cooper (1990, 1993, 1994 a,b).

CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH NEEDS

Certain empirical evidence (e.g., Cooper and Kleinschmidt 1987a;b) shows the strategic importance of organizational processes in the success of an innovation process. Among these findings the relevant literature recognizes the special importance of the generation and launching of a new product as well as the control process that must be undertaken in parallel.

The approach presented by Cooper (1990) allows us to define the process of product innovation as a system of stage-gates. Since the development and control processes within this system are developed by personnel from different functional areas, the coordination and management of a multi-functional work team is essential.

Although nowadays the literature recognizes the importance of the evaluation process in product innovation, few researchers have investigated the development of a measurement system for performing an overall innovation control. In other words, few systems have been developed to measure the way the company's objectives are achieved during the different stages of the generation process with the aim of controlling the new product development process and increasing its success and performance.

The direct impact of control systems on the realization of the innovation has favored the development of some systems with this main goal. Nevertheless, since they have basically focused on the analysis of financial data, these systems have been heavily criticized and even rejected in some situations, particularly considering their inefficiency in measuring the multiple dimensions that determine the success of a process. New control systems have been developed with the aim of solving this problem. Among these systems, the Balanced Scorecard presented by Kaplan and Norton (1992) has been one of the most successfully applied.

TABLE 1
Balanced Scorecard Measurement System

Perspectives	Measurement
Financial Perspective	Increase in sales Benefits per division Increase in market share Benefits for shareholders Benefits margin Period of restitution I+D costs Financial risk measurements Cost and development/investment costs Risk assessment cost-benefit data
Customer Perspective	Degree of customer acceptance Degree of customer satisfaction Perceived quality Perceived superiority Percentage of new customers Percentage of customer retention Degree of customer loyalty Brand image
Internal Company Perspective	Development process cost Development process speed Process efficiency Degree of employee information Availability of technological, human and economic resources Degree of market and customer orientation Degree of learning and innovation orientation Degree of quality orientation Degree of interfunctional coordination Degree of internal and external cooperation Degree of high-management support for the development of innovation processes Development of information processes of transmission and diffusion
Program Perspective	Success percentage in the launch of new products Benefits from the development of new products Average costs for the development of new products Number of launched products Number of abandoned projects Number of projects awarded
Market Perspective (Market Attractiveness)	Market size Market growth Company market position Potential sales volume Existence of latent customer segments Number of current competitors
Competence-Based Criteria	Capacity for reaction of the competition Degree of marketing orientation of the competition Quality of the competitors' products Image of the competitors' products
Product Perspective	Adaption of the new product to market needs and requirements Speed in the launching of the new product Consistency of the product with the resources and capabilities of the company Degree of strength of the new product image Customer degree of satisfaction with and fidelity to the new product
Marketing Perspective	Marketing capabilities Front-line personal capabilities Market analysis resources Ability to communicate with clients Company positioning Intermediary support

The BSC provides managers with a comprehensive analysis base that can be used to evaluate objectively the extent to which the company has achieved the objectives proposed. For this reason, Kaplan and Norton (1992) point out that the BSC is a control measurement criterion that can generate improvements in critical areas such as product management, customer management or market development. Certainly, this system offers a balanced group of criteria that measure the several dimensions included in a new project, all measurements having the same importance. Thus, presenting a balanced set of measurements, the system makes sure that one dimension of performance-or a set of them- is not stressed to the detriment of others and that information from different perspectives provides balance between external and internal measurements, allowing managers to look at the business from four important perspectives: financial, customer, business processes and learning and growth (Kaplan and Norton 1992, 1993, 1996). Hence, the system considers not only financial measurements but also criteria relating to customers as well as to internal, innovation and improvement activities.

Nevertheless, in spite of the fact that this system provides managers with up-to-date, useful and crucial information to value how that activity is carried out, the BSC minimizes the information generated. This may reduce the usefulness of the BSC for evaluating different market situations, product strategies, or competitive environments. This disadvantage led us to think about the need to consider additional indicators regarded as key in the success of the innovation process. Thus, it is suggested that new indicators of the dimensions of analysis already proposed by the Balanced Scorecard as well as four additional groups of dimensions should be incorporated.

On the one hand, the incorporation of measurements relating to financial data such as risk assessment or cost benefit data are considered among financial measurements. The inclusion of customer loyalty measurements or indicators relating to customers' perceptions regarding the superiority of the product in terms of added value is considered among the customer-based indicators. Finally, the possibility of incorporating measurements relating to the extent to which the company is oriented to the customer, the market, innovation and learning processes is also contemplated.

On the other hand, the level of interfunctional coordination in the organization is also recognized as a determinant factor in the success of the launching of new products. For this reason, the inclusion of indicators relating to the internal and external coordination of the organization would be of great interest to measure the interfunctional coordination or even to establish the existence of a high degree of integration between agents external to the organization. Finally, it is also of interest to determine the degree to which the organization is developing processes and actions oriented to the transmission and diffusion of information, or to high-management support.

Four groups of indicators must be created in order to complement the initially proposed dimensions: market-based criteria, competition-based criteria, product-based criteria and marketing-based criteria. These new realization indicators attempt to measure other dimensions included in the launching of new products and must include the generation of opportunities for the new products, the impact on the company's reputation, the impact on its market positioning, the obtaining of cost efficiencies, and increases in sales and benefits. In order to measure all these indicators, some evaluation criteria must be developed regarding market share, market attractiveness, marketing opportunities, sales objectives, product superiority, technical product viability, the launching of the product in time and the reactions of the competition.

TABLE 2
Information Needs and Performance Indicators in NPD Process Evaluation

Evaluation after each stage of development	Information needed for the evaluation: nature of the information	Performance indicators used in the evaluation process
Evaluation after idea generation	<ul style="list-style-type: none"> • Product fits with customers' needs and likes in order to obtain a market opportunity and a differential advantage • Product fits with competitive situation and nature of the market • Product fits with company objectives, resources, policies (synergy) • Company strategic alignment, project feasibility, magnitude of opportunity, market attractiveness, differential advantage, synergy with the firm's resources, and fit with company policies • Obtaining this information demands a preliminary market assessment • Preliminary technical assessment • Preliminary financial assessment 	<ul style="list-style-type: none"> • Predictions about company-based criteria • Predictions about market-based criteria • Predictions about customer-based criteria • Predictions about product-based criteria • Predictions about competence-based criteria
Evaluation after business analysis	<ul style="list-style-type: none"> • Manpower and technical resources required to implement the new product • Technical capabilities • Product development costs and benefits over time • Customer reaction to the innovation (determine market size, potential and likely market acceptance) • Response of the competition 	<ul style="list-style-type: none"> • Predictions about company- and program-based criteria • Predictions about market-based criteria • Predictions about customer-based criteria • Predictions about financially-based criteria • Predictions about product-based criteria • Predictions about competence criteria
Evaluation after process & system development (functional testing)	<ul style="list-style-type: none"> • Internal specifications about product production and delivery activities 	<ul style="list-style-type: none"> • Product-based criteria
Evaluation after product market testing	<ul style="list-style-type: none"> • Customer, product and marketing data 	<ul style="list-style-type: none"> • Market-based criteria • Customer-based criteria • Financially-based criteria • Product-based criteria • Company-based criteria • Competence-based criteria
Evaluation after launch/final preparation	<ul style="list-style-type: none"> • Resources needed to launch the new product on market 	<ul style="list-style-type: none"> • Market-based criteria • Customer-based criteria • Product-based criteria • Company- and programme-based criteria • Marketing based-criteria
Evaluation after product launch	<ul style="list-style-type: none"> • Customer response • Response of the competition 	<ul style="list-style-type: none"> • Market-based criteria • Customer-based criteria • Financially-based criteria • Product-based criteria • Company-based criteria • Competence-based criteria • Marketing based-criteria

REFERENCES

- Atuahene-Gima, K. (1995). "An Exploratory Analysis of the Impact of Market Orientation on New Product Performance". *Journal of Product Innovation Management*, 12, 275-293.
- Atuahene-Gima, K. (1996). "Differential Potency of Factors Affecting Innovation Performance in Manufacturing and Service Firms in Australia". *Journal of Product Innovation Management*, 13: 35-50.
- Avlonitis, G.J.; Papastathopoulou, P.G. and Goumaris, S.P. (2001). "An Empirically-based Typology of Product Innovativeness for New Financial Services: Success and Failure Scenarios". *Journal of Product Innovation Management*, 18:324-342.
- Bean, R.; and Radford, R.W. (2001). *The Business Innovation: Managing the Corporate Imagination for Maximum Result*. New York, AMACOM.
- Berry, L., Carbone, L. P. and Haeckel, S. H. (2002). *Managing the Total Customer Experience*. MIT Sloan Management Review, Spring.
- Blattberg, R. C. and Thomas, J. S. (2001). *Valuing, analyzing, and managing the marketing function using customer equity principles*. Kellogg on Marketing, ed. D. Iacobucci, 302-319, New York: Wiley & Sons.
- Brignall, S. and Ballantine, J. (1996). "Performance Measurement in Service Business Revisited". *International Journal of Service Industrial Management*, 7 (1):6-31.
- Clark, B.H. (1999). "Marketing Performance Measures: History and Interrelationships". *Journal of Marketing Management*, 15: 711-732
- Cook, T.J.; Vansat, J.; Stewart, L. and Adrian, J. (1995). "Performance Measurement: Lessons Learned for Development Management". *World Development*, 23(8):1202-1315.
- Cooper, R.G. (1990). "Stage-Gate Systems: A New Tool for Managing New Products". *Business Horizons*, May-June: 44-53.
- Cooper, R.G. (1993). *Winning at New Products: Accelerating the Process from Idea to Launch*. (1^o Edición) New York, Perseus Publishing.
- Cooper, R.G. (1994a) "New Products: The Factors that Drive Success". *International Marketing Review*, 11 (1):60-76.
- Cooper, R.G. (1994b). "Third-Generation New Product Processes". *Journal of Product Innovation Management*, 11:3-14.
- Cooper, R.G. (1996). "Overhauling the New Product Process". *Industrial Marketing Management*, 25:465-482.
- Cooper, R.G. and de Brentani, U. (1991). "New Industrial Financial Services: What Distinguishes the Winner", *Journal of Product Innovation Management*, 8: 75-90.
- Cooper, R. G. and Edgett, S. (1996). "Critical Success Factors for New Financial Services." *Marketing Management* 5(3): 26-37.

- Cooper, R.G. and Kleinschmidt, E.J. (1987a). "New Products: What Separates Winners from Losers". *Journal of Product Innovation Management*, 4:169-184
- Cooper, R.G. and Kleinschmidt, E.J. (1987b). "An Investigation into the New Product Process: Steps, Deficiencies, and Impact". *Journal of Product Innovation Management*, 3:71-85.
- Cooper, R.G. and Kleinschmidt, E.J. (1993). "Stage-Gate Systems for New Product Success". *Marketing Management*, 1(4):20-29.
- Cooper, R.G. and Kleinschmidt, E.J. (1995). "New Products Performance: Keys to Success, Profitability & Cycle Time Reduction". *Journal of Marketing Management*, 11:315-337.
- Cooper R.G.; Easingwood, C.J.; Edgett, S.; Kleinschmidt, E.J. and Storey, C. (1994). "What Distinguishes the Top Performing New Products in Financial Services". *Journal of Product Innovation Management*, 11: 281-299.
- Crosby, L.A. and Johnson, S.L. (2001). "High Performance Marketing in the CRM Era". *Marketing Management*, 10(3): 10-11.
- De Brentani, U. (1995). "New Industrial Service Development: Scenarios for Success and Failure." *Journal of Business Research* 32: 93-103.
- De Brentani, U. (2001). "Innovative Versus Incremental New Business Services: Different Keys for Achieving Success." *Journal of Product Innovation Management* 18: 169-187.
- De Brentani, U. and Cooper, R.G. (1992). "Developing Successful New Financial Services for Business", *Industrial Marketing Management*, 21,: 231-241
- De Brentani, U. and Rargot, E. (1996). "Developing New Business-to-Business Professional Services: What Factors Impact Performance?" *Industrial Marketing Management*, 25: 517-530.
- Day, G. S. and Wensley, R. R. (1988). *Assessing Advantage: A Framework for Diagnosing Competitive Superiority*. *Journal of Marketing*, 52(April): 1-20.
- Dekimpe, M. G. and Hanssens, D. M. (1999). Sustained Spending and Persistent Response: A New Look at Long-Term Marketing Profitability. *Journal of Marketing Research*, 36 (November): 397-412.
- Dixon, J.R.; Nanni, A.J. and Vollmann, T.E. (1990). "Strategic Control and Performance Measurement". *Journal of Cost Management*, Summer: 33-42.
- Easingwood, C.J. and Storey, C. (1991). "Success Factors for New Consumer Financial Services", *International Journal of Bank Marketing*, 9 (1),: 3-10.
- Easingwood, C.J. and Percival, J. (1990). "Evaluation of New Financial Services". *International Journal of Bank Marketing*, 8:3-8.
- Eccles, R. (1991). "The Performance Measurement Manifesto". *Harvard Business Review*, (January-February):131-137.
- Edgett, S. and Parkinson, S. (1994). "The Development of New Financial Services: Identifying Determinants of Success and Failure". *International Journal of Service Industry Management*, 5 (4):24-38.

- Edvinsson, L. (2002). IC-Rating, Available from: http://www.intellectualcapital.se/rating_more.htm
- Ghalayini, A.M. and Noble, J.S. (1996). "The Changing Basis of Performance Measurement". *International Journal of Operations & Product Management*, 16(8):63-80.
- Griffin, A. (1997). "PDAM Research on New Product Development Practices: Updating Trends and Benchmarking Best Practices". *Journal of Product Innovation Management*, 14:429-458.
- Griffin, A. and Page, A.L. (1993). "An Interim Report on Measuring Products Development Success and Failure". *Journal of Product Innovation Management*, 10(4):281-308.
- Griffin, A. and Page, A.L. (1996). "PDMA Success Measurement Project: Recommended Measures for Product Development Success and Failure". *Journal of Product Innovation Management*; 13:478-496.
- Grönroos, C. (2000) *Relationship Marketing: Interaction, Dialogue and Value*. *Revista Europea de Dirección y Economía de la Empresa* 9 (3):13-24.
- Gurviez, P. (1997). "Trust: A New Approach to Understanding the Brand-Consumer Relationship", in *New and Evolving Paradigms: The Emerging Future of Marketing*. Three American Marketing Association, Special Conferences. Dublin, Ireland: 504-518.
- Guthrie, J., Petty, R., Ferrier, F. and Wells, R. (1999). *There is no Accounting for Intellectual Capital in Australia: Review of annual reporting practices and the internal measurement of Intangibles within Australian organizations*. Proceedings of the OECD conference in Amsterdam, June.
- Hart, S.; Hultink, J.; Tzokas, N.; and Commandeur, H.R. (2003). "Industrial Companies' Evaluation Criteria in New Product Development Gates" *Journal of Product Innovation Management*, 20(1):22-37.
- Ittner, C. D., Kalafut, P., Larcker, D. F., Sean Love, S., Low, J., Park, J., Siesfeld, T. and Zito, S. (2000). *Measuring the Future: Value Creation Index*.
- Jaworski, B.J. y Kohli, A.K. (1994). "Market Orientation: Antecedents and Consequences". *Journal of Marketing*, 57 (July):53-70.
- Johne. A. and Storey, C. (1998). "New Service Development: A Review of the Literature and Annotated Bibliography". *European Journal of Marketing*, 32 (3/4):184-251.
- Kahn, K.B. (1996). *Interdepartmental Integration: A Definition with Implications for Product Development Performance*. *Journal of Product Innovation Management* 13:137-151.
- Kahn, K.B. (2001). *Market Orientation, Interdepartmental Integration, and Product Development Performance*. *Journal of Product Innovation Management* 18:314-323.
- Kaplan, R. and Norton, D.P. (1992). "The Balanced Scorecard Measures that Drive Performance." *Harvard Business Review*. 70(1): 71-79.
- Kaplan, R. and Norton, D.P. (1993). "Putting the Balanced Scorecard to Work." *Harvard Business Review* 71(3):134-142.
- Kaplan, R. and Norton, D.P. (1996 a). "Using the Balanced Scorecard as a Strategic Management System." *Harvard Business Review* 74 (1): 75-82.

- Kaplan, R. and Norton, D.P. (1996 b). "Linking the Balanced Scorecard to Strategy." *California Management Review* 39(1): 53-79.
- Kaplan, R. and Norton, D.P. (2001). *The Strategy Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment*. USA Harvard Business School Publishing Corporation.
- Keller, K. L. (1998). *Strategic Brand Management: Building, Measuring and Managing Brand Equity*. Upper Saddle River: Prentice-Hall.
- Lev, B. (2002). *Intangibles: Management, Measurement and Reporting*. Brookings Institution, Washington
- Neely, A. (1998). *Measuring Business Performance: Why, What and How*. Economist Books, London.
- Neely, A.; Gregory, M. and Platts, K. (1995). "Performance Measurement System Design: A Literature Review and Research Agenda." *International Journal of Operations & Production Management* 15(4): 80-116.
- Neely, A.; Mills, J.; Platts, K. and Bourne, M. (1997). "Designing Performance Measures: A Structured Approach." *International Journal of Operations & Production Management*, 17(11): 1131-1152.
- Neely, A.; Mills, J.; Platts, K.; Gregory, M. and Richards, H. (1996). "Performance Measurement System Design: Should Process Based Approaches Be Adopted?" *International Journal of Production Economics* 46-47: 423-431.
- Neely, A.; Mills, J.; Platts, K.; Richards, H.; Bourne, M. and Kennerley, M.(2000). "Performance Measurement System Design: Developing and Testing a Process-Based Approach." *International Journal of Operations & Production Management* 20(10): 1119-1145.
- Oldenboom, N. and Abratt, R. (2000). "Success and Failure Factors in Developing New Banking and Insurance Services in South Africa". *International Journal of Bank Marketing*, 18 (5):233-245.
- Olve, N. G., Roy, J., and Wetter, M. (1998). *Performance drivers. A practical guide to using the balanced scorecard*. Chichester: John Wiley & Sons
- Pawar, K.S. and Driva, H. (1999). "Performance Measurement for Product Design and Development in Manufacturing Environment" *International Journal of Product Economics*, 60-61:61-68.
- Rust, R. T., Zeithaml, V. A. and Lemon, K. N. (2000). *Driving Customer Equity – How Customer Lifetime Value is Reshaping Corporate Strategy*. New York: Free Press.
- Rust, R. T., Lemon, K. N. and Zeithaml, V. A. (2003). *Return on Marketing: using customer equity to focus marketing strategy*. Marketing Science Institute Working Paper.
- Sandvik, E. (2004). *Topplinjen –Sanseapparatet som gjør bedriften smartere*. URL: <http://www.humankapitalgruppen.no>
- Slater S.F. y Narver, J.C. (1995). "Market Orientation and the Learning Organization". *Journal of Marketing*, 59, (July)63-74.
- Slater, S.F. y Narver, J.C. (1994). "Does Competitive Environment Moderate the Market Orientation-Performance Relationship?" *Journal of Marketing*, 58, (January): 46-55.

- Srivastava, R.K., Shervani, T.A. & Fahey, A.L. (1998). Market-based assets and shareholder value: A framework for analysis. *Journal of Marketing*, 62 (January), 2-18.
- Srivastava, R.K., Shervani, T. A. and Fahey, A.L. (1999). Marketing, Business Processes, and Shareholder Value: An Organizationally Embedded View of Marketing Activities and the Discipline of Marketing. *Journal of Marketing*, 63 (special issue 99): 168-179.
- Storey, C. and Easingwood, C (1996). "Determinants of New Product Performance: A Study in the Financial Services Sector." *International Journal of Service Industry Management*, 7 (1):32-55.
- Storey, C. and Easingwood, C (1998). "The Augmenting Service Offering: A Conceptualization and Study of Its Impacts on New Service Success." *Journal of Product Innovation Management* 15: 335-351.
- Storey, C. and Easingwood, C (1999). "Type of New Product Performance: Evidence from the Consumer Financial Service Sector." *Journal of Business Research*, 46:193-203.
- Storey, C. and Kelly, D. (2001). "Measuring the Performance of New Service Development Activities: An Exploratory Study." *Services Industries Journal* 21(2): 71-95.
- Sveiby, K. (1997). *The New Organizational Wealth: Managing and Measuring Knowledge Based Assets*. San Francisco: Berrett Koehler.
- Szymanski, D. M. and Henard, D. H. (2001). Customer Satisfaction: A Meta- Analysis of the Empirical Evidence. *Journal of the Academy of Marketing Science*, 1: 16-35.
- Tuominen, M. and Möller, K. (1996). "Market Orientation: A State of the Art Review". *Proceedings of the 25th EMAC Conferenc*,:1161-1181.
- Vilaseca, J. and Torrent, J (Coord) (2003). *ICT and Transformations in Catalan Business*. Research Report II. Universitat Oberta de Catalunya. On line http://www.uoc.edu/in3/pic/eng/pdf/PIC_empresa_abs_eng.pdf
- Waggoner, D.B., Neely, A.D. and Kennerley, M.P. (1999). The forces that shape organisational performance measurement systems: an interdisciplinary review. *International Journal of Production Economics*, 60-61: 53-60.
- Woodcock, N. (2000). Does how customers are managed impact on business performance? *Interactive Marketing*, 1 (4): 375-389.
- Yeniurt, S. (2003). A literature review and integrative performance measurement framework for multinational companies. *Marketing Intelligence & Planning*, 21 (3): 134-142.