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The Incorporation of Sustainability Indicators into a Performance Measurement System

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Abstract

Sustainability indicators have emerged as a key element in a market where customers are interested in the environmental impacts of the products they consume. Companies are trying to incorporate them into their Performance Measurement System (PMS). However, there is little information available to managers to guide them on the incorporation. Hence, this paper presents the results of an action research carried out to improve the PMS of a Brazilian consumer goods company with the incorporation of sustainability indicators. The findings illustrate that is possible to incorporate them into the PMS as long as there are stakeholders interested in establishing strategic objectives for sustainability.

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1. Introduction

As customer demands are changing rapidly in terms of sophistication of products and services they require, organizations need to become more responsive to customer and market needs. In fact, the integrated management of product related information through the entire product lifecycle - known as product lifecycle management (PLM) - is a key element for companies in creating sustainable value. Thus, in order to proactively respond to these new demands, managers require up-to-date and accurate performance information on its business [1,2,3].

This performance information needs to be integrated and accessible to support the monitoring and the improvement of the performance of an organization and its business processes. Thus, a performance measurement system (PMS) is a vital part of a company's managerial system. The PMS of an organization can be defined as a set of indicators used to quantify the efficiency and/or the effectiveness of their actions [2].

After the Brundtland Commission first introduced the concept of sustainable development, a growing number of national and international organizations, governments, communities and companies are embracing sustainability. In this way, companies are facing tough challenges to succeed in a global competitive market especially to address this issue of sustainability [3]. It has inspired many researches and practitioners to search for ways to use tools for measuring and evaluating their progress. In this context, sustainability indicators have emerged as one widely accepted tool [3,4,5].

Therefore, an increasing number of voluntary initiatives and companies have begun developing and using sustainability indicators [6]. Such indicators might be used to improve a company's public image and thus create a competitive advantage through product/service differentiation. As a result, companies around the world have recognized the need to respond appropriately to the sustainable development challenge and, consequently, many have changed their business activities in product development [7,8]. This increasing upsurge of incorporation of sustainability in the processes to all phases of a product's life resulted into the need of assessment of its performance.

Over the past decade, several articles on corporate performance measurement system (PMS) related to sustainability have been published in a wide variety of journals [5]. A robust PMS can help decision makers overcome the challenges of corporate sustainability by helping them to better understand their current situation and

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their desired end state. The majority of researches on indicators have focused on design of sets of corporate sustainability indicators. However, despite several contributions, many corporations still struggle to develop, implement, use, and improve PMS [5,6].

Hence, there is an important gap since a robust PMS is required for a company to assess how well it is doing in meeting its sustainability priorities. This underscores the need for more research and the on the theoretical and practical aspects of PMS [5]. In this way, a study concerning performance measurement system addressing the processes to all phases of a product's life can contribute to the fulfillment of this gap.

Furthermore, to improve performance, managers have recognized that is necessary a better understanding and incorporation of sustainability indicators [9]. However, systems that present appropriate sustainability indicators are not common as well [10]. Indeed, managers need assistance in incorporating indicators that address the needs of both their internal and external stakeholders in terms of sustainability [3,5].

This paper aims at updating and improving a performance measurement system with the incorporation of sustainability for a Brazilian consumer goods company. Innovative tools and templates such as a list of performance indicators support this update and improvement. Because of their substantial size, they are not included in this paper. In this way, the paper begins with a brief discussion the main concepts of performance measurement and sustainability in the research background. Then follows a presentation of the research method adopted. The findings of the action research are later presented. The paper concludes with a summary of lessons learned and possible contributions to update and improve a PMS for a company.

2. Research background

As indicated previously, performance measurement is the process of quantifying efficiency and effectiveness of actions. To this end, performance indicators should be chosen, implemented, and monitored. Performance indicators are the metric used to quantify the efficiency and/or effectiveness of actions of part or of an entire process or a system in relation to a pattern or target [2]. These performance indicators are essential elements for planning and strategic control cycles [11].

The Balanced Scorecard (BSC) is the most known and frequently applied PMS used by companies worldwide to translate strategic objectives into a set of actions and performance indicators. The BSC arranges the indicators in four perspectives: 1) financial; 2) customers; 3) internal processes, and 4) innovation and learning [12].

The PMS should always be related to strategy and, consequently, to many processes within the companies. In this paper, the PMS should address the PLM approach which is defined as the integrated management of product related information through the entire product lifecycle, from the definition of an initial concept to the product´s end-of life processes. This approach is a key element for companies in creating sustainable value. It became a competitiveness factor in a market where customers are interested in the environmental impacts of the products they consume [29,30]. In this way, the PLM requires the incorporation of sustainability indicators.

The sustainability indicators address the sustainable development among the companies. The most common definition of sustainable development was introduced by the Brundtland Report [15]. It defines sustainable development as the development that meets the needs of the present without comprising the ability of future generations to meet their needs [16,17].

Accordingly, the Triple Bottom Line (TBL) has emerged as the concept of sustainability as the integration of economic, environmental and social dimensions [18]. The TBL is a critic concept for many organizations because it implies that the firm's responsibilities are much wider than simply those related to the economic aspects of producing products and services that customers want, to regulatory standards, at a profit [10]. The TBL adds social and environmental indicators of performance to the economic indicators typically used in most organizations performance.

In accordance with this view, the Global Reporting Initiative (GRI) is an important initiative that works towards a sustainable global economy by providing sustainability reporting guidance in the TBL dimensions [20]. GRI has pioneered and established a comprehensive sustainability reporting for voluntary use. This is the world's most widely used sustainability reporting tool [16, 21] and the performance indicators listed therein are used to measure and report their economic, environmental, and social performance [22]. Also a wide range of sustainability performance indicators are also found in standards and like ISO 14000 (International Organization for Standardization), the latest in social responsibility ISO 26000 and OHSAS18000 occupational health and safety (Occupational Health and Safety Assessment Services) [16]. All of these standard and report can be used as sources to develop a list of performance indicators.

The interest in the incorporation of features of sustainability in PMS is increasing due to the substantial strategic and integration of non-financial indicators for the organization [12]. Although the BSC does not explicitly address the environmental variable, its use as a tool for managing social and environmental issues has been suggested by different authors [9, 10, 23, 24].

In order to incorporate the sustainability performance indicators into a PMS, such as the BSC, there are three different approaches [23, 24, 25]. The first approach lies in the restructuring of the existing perspectives in order to incorporate sustainability issues; the second refers to a new key perspective and the third is based on the creation of a specific environmental and/or social BSC.

The first approach to integrating sustainability into the BSC does not modify the arrangement of the four perspectives. Research and case studies have shown that this approach allows incorporating all sustainability issues that have direct relevance to the financial market and the customer market [24]. The financial perspective should describe not

only the outcomes in conventional financial terms but also in terms of the market significant corporate sustainability issues.

The second approach integrates a new nonmarket perspective with the purpose of complementing all four conventional perspectives by nonmarket issues that are not yet covered. The introduction of an additional non-market perspective is relevant as long as environmental and social aspects from outside the market system are explicitly representing the strategic core aspects for the successful execution of the strategy of the business. Moreover, the nonmarket perspective does not incorporate all sustainability oriented objectives and indicators of the business, but only nonmarket issues that cannot be covered in the conventional perspectives [23].

Finally, the third lies in the deduction of an environmental and/or social BSC. This derived environmental or social scorecard cannot be developed parallel to the conventional scorecard, thus it is not an independent alternative for integration, but only an extension of the two approaches previously stated. Therefore, it is predominantly used in order to coordinate, organize and further differentiate the environmental and social aspects, once their strategic relevance and position in the cause-and-effect chains have been identified by the two approaches [23, 25].

3. Research method

This section discusses the research method adopted and describes its steps. There are many different methods that can be applied in operations management [26]. In this paper, in order to conduct the empirical study accordingly to the characteristics of the study, research background and the research objective, the action-research presented itself as the most appropriate method.

The main characteristics of the action research are: it focus on research in action, rather than research about action; it uses a scientific approach to study the resolution of important organizational issues together with those who experience these issues directly; it works a cyclical four-step process of consciously and deliberately: diagnosing, planning, taking action and evaluating the action, leading to further planning and so on; it is participative, i.e., member of the system which is being studied participate actively in the cyclical process outlined above; and it is concurrent with action making the action more effective while simultaneously building up a body of scientific knowledge [26].

During the action research, semi-structured interviews and data collection from the information system, technical reports, and internal documents of the company were the information sources used to identify and describe the current PMS. A total of six directors and managers related to areas concerned with PLM business processes were interviewed. All of them were involved either with the development or the use of the PMS. Besides, workshops held for developing and improving the PMS took place with a multidisciplinary group of seven employees from diverse areas of the company. As a result, the PMS was updated and improved based on the interactive cycles of diagnosing, planning, taking action and evaluating the action, and later adjusted according to the needs and feedback of the company. The members of the multidisciplinary group validated the indicators and the measurement procedures.

4. Results

This section outlines the highlights of the action research. First of all, the company in which was conduct action research is the main subsidiary of multinational manufacturer in the consumer goods segment. The company produces more than a thousand different items that supply the domestic market and exports to over 70 countries. It has an integrated management system which includes the certifications ISO 9001:2000, ISO 14001 and Forest Stewardship Council (FSC).

The action research was conducted in four main cycles. The first cycle addressed the diagnosis of the current PMS (section 4.1). The second and third cycles intended to design the indicators for monitoring the strategic objectives and key actions (section 4.2). To conclude, a fourth cycle was performed in order to implement the designed indicators (section 4.3). It is worthy of attention the fact that despite the great importance of information system, it is beyond the scope of this paper.

4.1. Diagnosing the performance measurement system

Primarily, it was possible to observe which processes related to the PLM approach were conduct in the company. In this way, the business processes were: Strategic Planning of Innovation (SPI); Research and Development (R&D), New Product Development (NPD) and Product Accompanying and Retirement (PAR) were present at the company.

The company had four indicators related to the PLM approach shown in a physical poster, which supposed to deal directly with the PLM. They were: 1) number of stock keeping unit per employee; 2) monetary value of expenses value per increase in wages, 3) number of projects per type of project, and 4) new product index performance - percentage of new product sales per time. However, these indicators were no longer used neither to identify actions to improve performance, nor monitor strategic objectives. It also presented more than 600 sustainability indicators raised annually in a report. More five financial indicators that were used by the marketing department to approve projects founding were no longer used to monitor product life after launch. And, at last ten more indicators daily collected in the shop floor.

At this point, it was recognized the need to the identity the maturity level of the current PMS. As stated by the interviewees, this could motivate the company to review and update the PMS in order to improve it. This step is not included in the BSC developing process. In fact, this is a innovation to all PMS found in the literature. The maturity level was rated as 2, characterized as “teenager” [31]. Therefore the upcoming activities identified should be related in order to achieve level 2 considering the gaps: communication of results and quality of the performance measurement process. This confirmed the need to apply the procedure to design the indicators in the next cycle.

A few preliminary requirements were identified as the need to access the utilization of ideas, the level of innovation, the accompaniment of competition, the monitoring of ongoing projects and the monitoring of customer satisfaction.

As a result of this cycle, it was verified the importance of the procedure to identify: the PLM business process, the indicators currently used in the company, the PMS maturity level and the preliminary requirements for the PMS.

4.2. Designing performance indicators

The initial step of this cycle was to identify and select the participants of the multidisciplinary group and interviewees. The facilitator positioned in a chart the stakeholders identifying the degree of interest they have in the decision and the degree of power they may exercise. The degree was measured in a qualitative scale of weak, moderate, strong and very strong. Thus, six people were identified to be interviewed and more seven others were selected to the multidisciplinary group.

Afterwards the interviews took place in order to define the strategic objectives. The interviewees were invited to talk about the preliminary requirements and the objectives they had based on the strategic planning. The strategic objectives were the following: to increase the revenue of the new product project; to increase in contribution revenue; to increase the perception of innovation by clients and customers; to increase the differential innovation; to increase realization of the number of projects; to increase the amount of generating ideas per person (culture); to reduce time to market; to seek the voice of costumer; to conduct technology prospection; to track the progress of the product on the market over time; to increase the use of ideas, and to eliminate the restrictions of innovation management. Later, these strategic objectives were detailed in order to the multidisciplinary group gain knowledge.

Thus, to each strategic objective, an indicator was designed. First, it was verified if there was any indicator already available in the company to monitor the objective in question. If none indicator was selected, then the facilitator should use the list of performance indicators related to the PLM approach and also sustainability indicators and select the most suitable indicator. The gathering of performance indicators found in the literature developed this list that should be used as a reference. In this way, only four indicators already used in the company were select and fifteen new indicators were designed. These indicators were customized to the context of the company. Later its attributes such as formula and source of data were completed along with its reference value. Finally, the indicators were validated with the approval of the multidisciplinary group.

After that, a need to cascade a strategic objective was identified. The objective was to increase the perception of innovation by clients and customers. For example, to the indicator “ranked as nº 1 by 75-100 % of the interviewees” two key actions were established in order to achieve the reference value. The first was to increase the communication of the innovation and the second to raise the potential of distribution channels and stores.

Considering these two key actions, new indicators were designed and customized to the context of the company. Their attributes were completed along with its reference value also completed as the previous indicators.

A second cycle was conduct in order to incorporate the sustainability performance indicators. The reason was that the three of the strategic objectives raised by the manager of sustainability have not been validated by other interviewees (directors). In order to fill this gap, the indicators to monitor these strategic objectives were designed in accordance with the facilitator of the company. The new strategic objectives that should be incorporated were: to increase the perception of innovation by clients and customers, to seek more environment friendly materials and to reduce the waste, natural resources and emission of greenhouse gases.

The summary of the main indicators designed can be seen in Fig. 1. The BSC was developed in order to encompass the concerns of sustainability in all dimensions. Each of the BSC dimensions was also adapted to the context of the company. In this way, the dimensions were: financial impact, perception of clients and customers, internal processes and culture. Within each of these mentioned dimensions, the strategic objectives were settled and linked to each other considering also the three objectives concerning sustainability. The effort was to incorporate the sustainability, as it was perceived to improve and complement the business.

4.3. Implementing performance indicators

Firstly, for the 19 designed indicators (see Fig. 1), the missing attributes: who is informed, who analyzes the data and when the analysis takes place, frequency and format were defined At the time, the a prototype [32] of the solution presented: a summary of designed indicators showing the attributes previously mentioned; a mechanism for reviewing the PMS; an example of the visualization of a dedicated software and the record sheets of every indicator designed. The solution was validated within the multidisciplinary group.

Secondly, after the validation of the indicators, it was noted the need to demonstrate a few considerations towards information systems. In this way, the company should automate the information systems for data collection and communication of PMS.

Thirdly, barriers were identified within the company. In this manner, it was required to identify and remove the barriers such as difficulty of access to information in information technology (IT) systems, lack of involvement of different areas and behavior of preference of maintaining the *status quo* without the use of the designed indicators. It was observed the implementation can be seen as a new project, so the responses to the barriers could be managed by technical and project management tools [27]. Hence, for each barriers should be designed a set of responses to the risks and thereby remove them by elaborating a risk management plan [29].

Fourthly, the need of registering the improvements in the PMS and the lessons learned identified was identified. And, finally, the importance of showing the next steps in the use phase of the PMS, such as measure performance indicators, check deviations and take corrective action emerged as well.

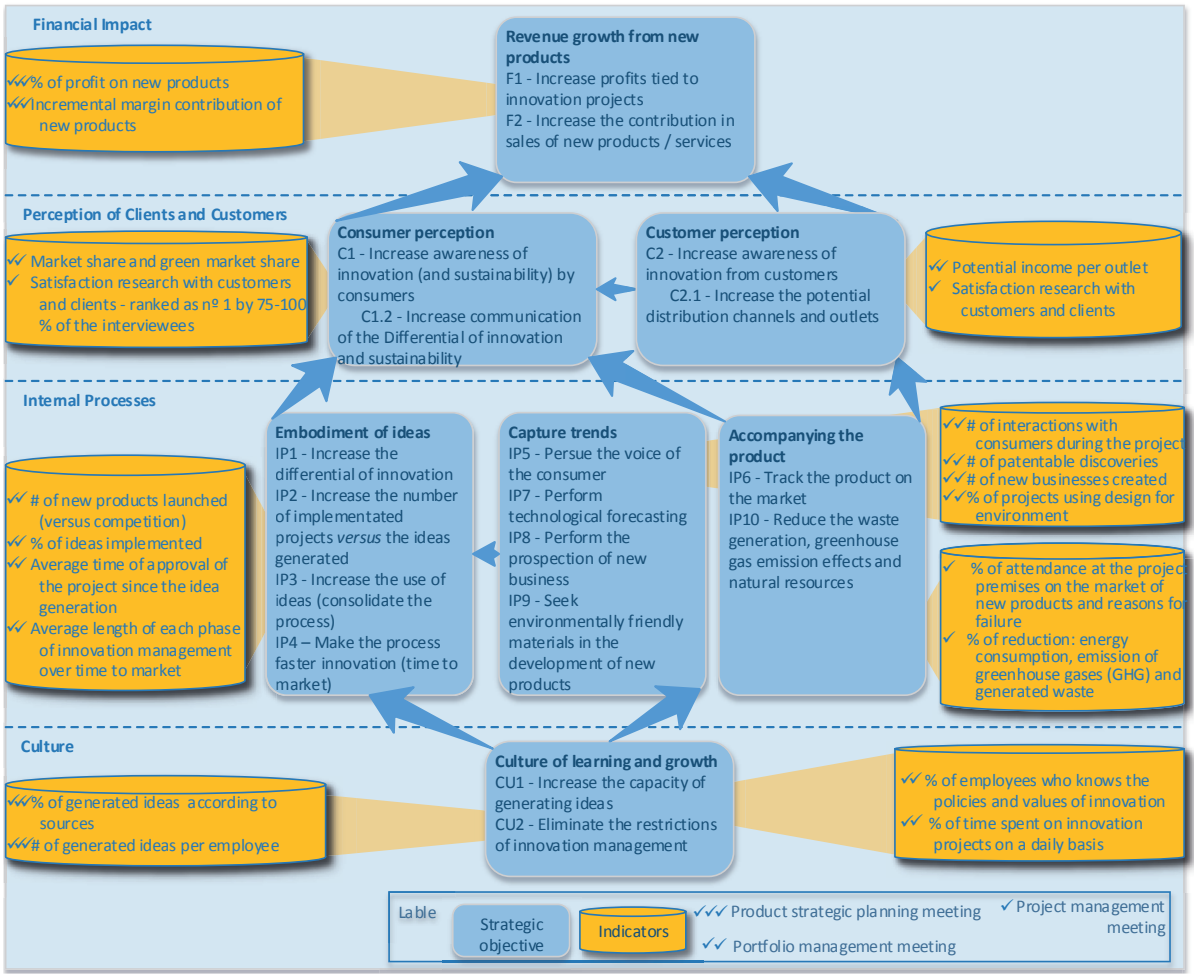

Fig. 1. Summary of the performance measurement system.

5. Conclusions

This study provides insights that can help researches and professionals interested in incorporating sustainability performance indicators for its PMS. The action research has been proved to be a useful research method to accompany the update and improvement of the company´s existing PMS.

There are a significant number of improvements and innovations in the process of the update and improvement a PMS, particularly a BSC, for a company that can be concluded from this research. In this way, they are discussed as follows.

The first innovation is that a diagnosis of the existing PMS was extremely helpful to identify the applicability and quality of the current PMS. Originally, the development of a BSC does not address this subject. However, the diagnosis is important to ensure the successful implementation of the PMS because it is possible not only to identify indicators that can later be used or discarded but also identify the desired level of maturity and consequently fulfil the gaps found.

Secondly, the existing initiatives, such as sustainability reports and standards should be considered when a PMS is being develop or updated and improved. Although, there are studies that use the BSC concerning sustainability, they do not consider the existing reports. The objective was not the define a large number of sustainability indicators with no use to the business, but to incorporate de ones that related to the strategic objectives. And as the company grows its awareness in sustainability issues, the BSC tends to be more complete. Besides, the identification of actors allows stakeholders that hold interest, but not the power in the decision (as the case may be responsible for the area of sustainability) to design relevant indicator such as sustainability indicators.

Thirdly, the aid of selecting new indicators by means of a systematic list of performance indicators was found to be a positive innovation. The use of a list as mentioned in this study is a novelty in the process of updating and improving the BSC. Furthermore, this list now includes indicators of sustainability performance indicators beyond the ones related to the PLM approach.

Fourthly, in general, the development of a PMS requires the definition of key actions to achieve the stated strategic objectives and thus define new indicators to monitor these actions. As a lesson learned, the activity of identifying the key

actions by fostering discussion and facilitates the design of indicators to monitor the actions.

Fifthly, the matter of registering improvements in the PMS and lessons learned identified should be taken into account. This step is also new to the process of developing a BSC and it an important contribution to the process. Generally, the development of PMS neglects these steps, but they are essential if the company does not lose the knowledge generated.

The final innovation addresses the use phase of the PMS. The importance of steps such as measure performance indicators, check deviations and take corrective action. These steps are important because they draw attention to one of the fundamental roles of SMDs to foster improvement actions and therefore influence the behavior of people.

It is worth mentioning that despite the growing importance and contribution of performance indicators for sustainable PMSs in the literature, a fact that drew attention was the lack of importance and priority given to sustainability indicators by major stakeholders when compared to others. Even with the newly created area of sustainability, the board did not consider significant the incorporation of sustainability indicators and, thus, the third cycle was needed to develop them. This may have occurred because sustainability is a complex subject and is still being discussed by the company and, above it still does not reflect the more immediate concerns of key stakeholders.

Finally, this study presents two limitations discussed. It results from an action research, so the outcomes are limited to a particular context, i.e., the practices of this particular company. Also, the implementation of a PMS requires the support and implementation of IT systems. However the implementation was beyond the scope of this paper.

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