Abstract

This paper aims to present the empirical findings from a case study on the dimensions of performance measurement systems (PMS’s) maturity in a Brazilian beverage company. The development of an integrated management system and the implementation of a reference model by state quality award have acted as triggers for performance measurement system changes in the studied company. The changes were associated to PMS maturity dimensions selected from the literature review. The following dimensions were observed: performance measures, infrastructure, use of PMS, people, deployment, and results. The formalization of PMS processes dimension was not observed what does not mean this dimension is not relevant. Maybe no change was observed because it was mature enough.

Keywords
Performance measurement systems, performance measurement maturity

1. Introduction

Performance measurement systems are an essential and critical element of any managerial systems. In the past, Managerial Accounting Systems were the foundation of traditional PMS’s. The decision makers used such system mainly for controlling purposes. The traditional financial and productivity performance measures were their essential elements. Since the end of 1980’s, the performance measurement systems have been facing a revolution [1]. The main causes are:

- The changing nature of work since direct labor is no longer the main source of costs;
- Increasing competition for achieving customer satisfaction;
- Specific improvement initiatives as Total Quality Management and Lean Manufacturing;
- National and international awards which require a new PMS;
- Changing organizational roles, which means more people use PMS information;
- Changing external demands, which means new stakeholders with different demands; and
- The power of information technology in acquiring, analyzing, and disseminating PMS information.

It is risky to think that the solution to inappropriate performance measurement system is the implementation of new framework such as Balanced Scorecard, for instance. The implementation of new PMS frameworks is a difficult change process with many failures [2]. The implementation of the Excellence Model of the Brazilian National Quality Award requires more than a new performance measurement system framework. It is necessary to change other elements rather than frameworks [3]. It is worth to note that national and international awards are one of the causes of performance measurement revolution [1]. Moreover, different levels of quality management maturity require different levels of performance measurement system maturity, but those authors did not establish the maturity dimensions [3]. Therefore, it is important to indentify both theoretically and empirically the maturity dimensions to guide the changes in performance measurement systems.

2. Performance Measurement Systems

There is no single definition of performance measurement system in the literature. A comprehensive definition is a “set of processes an organization uses to manage its strategy implementation, communicate its position and progress, and influence its employees’ behaviors and actions. It requires the identification of strategic objectives, multidimensional performance measures, targets, and the development of a supporting infrastructure.” [4]. Another interesting definition is “performance measurement system enables informed decisions to be made and actions to be
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taken because it quantifies the efficiency and effectiveness of past actions through the acquisition, collation, sorting, analysis, interpretation, and dissemination of appropriate data” [1].

A performance measurement system consists of individual performance measures, a set of performance measures, for both the internal and external environment in which the performance measures are used, and supporting infrastructure that enables data to be acquired, collated, sorted, analyzed, interpreted, and disseminated [1] [5].

There are many reasons to measure performance. The roles can be classified in three main categories [6]:

- Strategic: the roles of translating the strategy into performance measures to support the implementation and challenging the assumptions behind the strategy;
- Communication: the roles of checking position, complying with the non-negotiable parameters, communicating direction, providing feedback and benchmarking; and
- Motivational: the roles of evaluating and rewarding behavior and fostering improvement and learning.

Another reason to measure performance is the use of PMS information in planning, controlling and improving activities at different levels of organization. The use of information in different activities as well as at different hierarchical levels requires different kind of information [7].

Since the acknowledgement of the inadequacy of the traditional PMS’s, during the 1990’s, the PMS research efforts were focused on the development of new frameworks. However, some empirical findings reported failures in changing traditional PMS’s. Other empirical findings suggest the use of new performance measurement systems for controlling purposes rather than for improving performance. This means that the foreseeable revolution is not only a matter of implementing new framework. There are other dimensions which are as important as the frameworks.

Furthermore, the empirical findings indicate that there are different levels of performance measurement system maturity [3]. It is important to highlight that the maturity level should be in harmony with the roles and use of performance measurement systems in organizations.

2.1 Performance Measurement System Maturity

Maturity is “a very advanced or developed form or state” [8]. Maturation is the process of becoming an advanced or completely developed form or state [8]. Maturity is a level and maturation is the process. Learning curve is a classical example of maturity and maturation. Thus, it is reasonable to think that there are many maturity levels during the maturation stage until reaching the definitive mature state. It breaks the binary idea of revolution just happens when a new performance measurement system framework is implemented.

Today, remarkable characteristics of most organizations around the world are changes and their pace. Therefore, it is important for a PMS to keep the pace with changes in both organizations’ internal and external environment. Performance measurement systems must be seen as dynamic mechanisms which modify their elements and frame to keep the pace for providing relevant information for decision makers at different levels of hierarchy [5] [9-11]. There are four aspects that can affect changes and evolution of performance measurement systems: (i) internal influences, e.g. power relationships and dominant coalition interests; (ii) external influences, e.g. legislation and market volatility; (iii) process issues, e.g. ways to implement and manage political processes; and (iv) transformational issues, e.g. degree of top-level support and risk of gaining or losing due to changes [12].

Considering such dynamics, Figure 1 exhibits a process to manage the PMS evolution.

The four stages – use, reflect, modify, and deploy – form a continuous cycle to change individual measures, a set of measures, and the supporting infrastructure. The use stage is the starting point of any change. There are enablers in each stage except in the use stage grouped in: process for reviewing, modifying, and deploying the measures; people who are skilled to use, reflect, modify, and deploy the measures; culture that ensures the value of measurement; and systems that enable collection, analysis, and reporting of appropriate data. There are also external and internal triggers [5]. The forces of Waggoner et al. can act as triggers in Figure 1. In spite of that, there is no empirical investigation of such evolution.

According to Figure 1, process, people, culture, and systems are dimensions of performance measurement systems maturity. Nevertheless, the PMS should be different at different stages of product life cycle in order to reflect the priority of each stage [13]. Following the Capability Maturity Model, Wettstein and Kueng suggest five different levels of maturity (ad-hoc, adolescent, grown-up, and mature) to determine the scope of measurement, data collection, source of data, communication of results, use of performance measures, and formalization of performance measurement processes. Maturation is driven by: rivalry among competitors, information need from managers, company-external requirements, and information technology capabilities [14]. These can act as triggers in Figure 1. Van Aken et al. pose the development and application of the Improvement System Assessment Tool (ISAT) for assessing the effectiveness and maturity of PMS’s. In the ISAT, there are four scoring dimensions:
Araujo and Martins approach that assesses the PMS development process; deployment that assesses the metrics development and implementation; study that assesses the metrics, data collection, use, and communication; and refinement that assesses the PMS improvement [15].

Figure 1: Framework of factors affecting the PMS’s evolution [5]

Table 1 summarizes all the performance measurement systems maturity dimensions from the literature review – performance measures, infrastructure, use, formalization of PMS processes, deployment, and results in accordance with the references. The letter “x” means the dimension is cited by the author or authors. Although deployment and results were cited only by one reference, they were considered relevant to PMS maturity.

Table 1: Performance measurement systems maturity dimensions

<table>
<thead>
<tr>
<th>References</th>
<th>Performance measures</th>
<th>Infrastructure</th>
<th>Use</th>
<th>People</th>
<th>Formalization of PMS processes</th>
<th>Deployment</th>
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3. Research Method

The applied research design was a qualitative case study approach. Such design emphasizes the perspective of people involved with research issues, the description of context in which the studied phenomenon happens, and the timeline of events [16] [17]. One remarkable characteristic of the qualitative approach, as well of the case study method, is the flexibility in carrying out the investigation through the use of observation, interviews, and document analysis [17].

The studied company is one of the major Brazilian bottling franchises, worldwide leader of non-alcoholic beverage, located in the province of Sao Paulo state. Last year, the company manufactured approximately 92.7 millions of gallons with 2,200 employees. Since 2005, the company has developed an integrated management system (IMS) based on ISO 9001, ISO 14001, ISO 22000, and OHSAS 18001 norms. Since 2006, the company has been
implementing the Excellence Model of the State of Sao Paulo Quality Award, silver medal winner in 2007 and 2008. During the case study development, the researchers tried to investigate the interviewees’ perspectives on the PMS changes after the implementation of both the integrated management system and the Excellence Model of the State of Sao Paulo Quality Award. The interviewees were: PMS Coordinator, IMS Coordinator, Strategic Planning Analyst, and Strategic Planning Manager. The PMS maturity dimensions from the literature review, shown in Table 1, were the bases to carry out the research – questionnaire development and field observation.

4. Main Empirical Findings
The development of IMS based on the cited norms (quality, environment, health and safety, and food safety) and the implementation of a reference model of quality award required the review of strategic planning activities in the studied company, according to the interviewees except the strategic planning manager. A Strategic Planning Department was created in order to manage the strategic planning process including the performance measurement activities. It is interesting to highlight that the creation of such department acted as a trigger to change the performance measurement system in the studied company, as shown in Figure 1.

The strategic planning process starts with the definition of the company’s vision using SWOT (strengths, weaknesses, opportunities, and threats) analysis engaging top and middle managers. During the SWOT analysis and prioritization, performance measures play an important role showing the performance gaps and trends based on past performances. Then the main strategic objectives are established. According to the PMS coordinator and Strategic Planning Analyst, the most important objectives of operations are in general: production ratio, production capacity, operational efficiency, raw material waste, and production cost. After that, strategic objectives are deployed to operational areas involving line managers, supervisors, and other key people. The departments’ objectives are linked to strategic objectives. Performance measures and targets are set up. Finally, the top management team approves the strategic objectives for the next year. The trends or benchmarks are applied to establish the targets. It is worth mentioning that the studied company, as a franchiser, has access to benchmark information from other franchised companies.

Once the strategic planning was set up, there were monthly review meetings in every department to control the strategy implementation. The performance measures play again very important role as sources of information about the past performance. There are several employees involved full time in managing performance measurement activities such as collecting, compiling, sorting, processing, analyzing, and disseminating appropriate information. If during those meetings the people involved note some performance gaps, they must open the Corrective Action Plan (CAP) to put performance back on track. The top managers audited the performance comparing the target and the performance looking for high variation. Then they question the responsible person for performance measures about the cause of poor performance and demand the development of CAP.

Every employee involved in performance measurement activities compiled the performance data from different sources as Enterprise Resource Planning (ERP) database or electronic spreadsheets. Sorting, processing, and analyzing activities are also performed in electronic spreadsheets which include the CAP. All those spreadsheets were developed by company’s employees. The PMS Coordinator stated they would soon migrate to Business Intelligence System, which he believes will improve the performance measurement activities. The visual boards, the electronic spreadsheets, and printed reports disseminate information about performance.

According to the interviewees, the managers do not use the PMS in the same manner. Some of them do not understand well the link between performance measure and the strategic objective. Others see measure performance as a waste of time. The PMS coordinator and Strategic Planning Analyst believe those behaviors are related to reluctance to measure performance although they were trained in interpreting the performance measures to help to implement the strategy.

In Table 2, the reported changes in PMS of the studied company are associated to performance measurement system maturity dimensions. The rationale is if there is any change in the dimension, then it is relevant. On the other hand, this is not true when there is no change; then, maturity dimension is not relevant. This is due to the fact that the observation performance measurement system maturity dimension is influenced by its scale. If the dimension is very mature, no change will be observed. The reported changes in the studied company’s performance measurement system happened due to the development of an integrated management system and the implementation of a reference model of state quality award. Those triggers started changes in company’s PMS. Those changes can be associated to performance measurement system
maturity dimensions as summarized in Table 2. It is worth to observe that the integrated management system was developed based on quality implement, environment, health and safety, and food safety norms.

It was also observed that some methods and techniques also acted as triggers to change the performance measurement system in the studied company. The SWOT analysis and the Corrective Action Plan were performance measurement dependent methods, i.e., performance measurement is used when either an analysis or a plan is being developed.

<table>
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<th>Dimension</th>
<th>Observed change</th>
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| Performance measures | The number of performance measures decreased with the definition of strategic objectives  
The cause-and-effect relationship was established between the strategic performance measures and the operational performance measures |
| Infrastructure     | Change in all performance measurement activities with comprehensive application of electronic spreadsheets and the assignment of a full time employee to handle those activities  
Application of a visual board to disseminate the information about performance |
| Use                | Use in strategic planning process for planning and control purposes                |
| People             | Training for interpreting performance measures although not every manager shares the same view of PMS |
| Formalization of PMS processes | No change                                                                 |
| Deployment         | The strategic objectives are deployed to the operational level                     |
| Results            | There is a top manager audit to check high variations compared against the target Corrective Action Plan |

Another important empirical finding is the dependence between the performance measurement system maturity dimensions. The trigger, the strategic planning process in this study, has initiated a new use to PMS. Then, it was necessary to change the performance measures, train people, develop spreadsheets, assign an employee to handle performance measurement activities, deploy strategic objectives, and audit the results. The relationship between the maturity dimensions is not simple and they influence themselves. Hence, it is important to study in detail such relationships in order to understand better how a performance measurement system matures.

5. Final Remarks
This paper aimed to study the performance measurement system maturity dimensions through a simple case study. The observed changes in a company’s PMS were associated to the maturity dimensions selected from the literature review. The selected company for this study has been implementing a strategic planning process for three years. Such process was established to comply with the new integrated management system based on norms and implementation of reference model of state quality award. These triggers started a change in the company’s PMS that has led it to another level of maturity. Other triggers such as SWOT analysis (planning) and CAP (control) were also observed.

Almost all performance measurement system maturity dimensions selected from the literature review were observed in the case study as shown in Table 2. Other maturity dimensions were not observed. The “Formalization of PMS Processes” dimension was not observed because it was not necessary to change it. This means that some maturity dimensions could be not observed because their maturity level can influence observation. If the dimension is mature enough, no changes will occur. It was also observed the dependence between the dimensions during maturation of the PMS, but this finding deserves further research.

More empirical studies are necessary to understand better the performance measurement system maturity dimensions, but a small step has already been given in this paper in order to establish the dimensions. The dimensions of Table 1, selected from literature review, could be used as reference basis for further investigation. It was observed the need of investigating the maturation process because of the relationship between the dimensions during the change and the maturity scale to evaluate better the change of PMS in terms of maturity dimensions.
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References