



A proactive balanced scorecard

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ABSTRACT

This paper describes a methodology for the development of a proactive balanced scorecard (PBSCM). The balanced scorecard is one of the most popular approaches developed in the field of performance measurement. However, in spite of its reputation, there are issues that require further research. The present research addresses the problems of the balanced scorecard by utilizing the soft computing characteristics of fuzzy cognitive maps (FCMs). By using FCMs, the proposed methodology generates a dynamic network of interconnected key performance indicators (KPIs), simulates each KPI with imprecise relationships and quantifies the impact of each KPI to other KPIs in order to adjust targets of performance.

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1. Introduction

Today, companies are evolving in turbulent and equivocal environments (Drucker, 1993; Grove, 1999; Kelly, 1998). This requires companies to be alert and watchful so as to detect weaknesses (Ansoff, 1975) and discontinuities in regard to emerging threats and opportunities and to initiate further probing based on such detections (Glykas, 2004). The strategic role of performance measurement systems has been widely stressed in management literature. These systems provide managers with useful tools to understand how well their organisation is performing and to assist them in deciding what they should do next (Neely, 1998; Glykas & Valiris, 1999).

Performance measurement systems have grown in use and popularity over the last twenty years. Organisations adopted performance measurement systems for a variety of reasons, but mainly to achieve control over the organisation in ways that traditional accounting systems do not permit (Kellen, 2003). A review of the literature shows that traditional performance measurement systems (based on financial measures) have failed to identify and integrate all those factors that are critical in contributing to business excellence (Eccles, 1991; Fisher, 1992; Hayes, Wheelwright, & Clark, 1988; Kaplan, 1983, 1984; Maskell, 1992).

During the last decade, a number of frameworks, that help in designing and implementing performance measurement systems, has been identified in the literature, such as the balanced scorecard (Kaplan & Norton, 1992), the performance prism (Kennerley & Neely, 2000), the performance measurement matrix (Keegan, Eiler,

& Jones 1989), the results and determinants framework (Fitzgerald et al., 1991), and the SMART pyramid (Lynch & Cross, 1991). These frameworks aim to assist organisations in defining a set of measures that reflects their objectives and assesses their performance appropriately. The frameworks are multidimensional, explicitly balancing financial and non-financial measures (Kennerley & Neely, 2002). Furthermore, a number of researchers have proposed a wide range of criteria for designing performance measurement systems (Globerson, 1985; Maskell, 1992; Morris, 2002).

Despite the existence of numerous approaches (frameworks, criteria, etc.) it is evident, from the literature, that the need for a broader research in the field of performance measurement is required. The criticism about the *static* nature of performance measurement systems as well as the *relationships* and *trade-offs* that exist among different measures is the catalyst for this research. Furthermore, the software applications that have been developed so far lack of an analytic capability and they cannot do *predictive modelling* (Morris, 2002). Despite the many attempts in this area (EIS, decision support tools), it is claiming that these tools do not necessarily advance the decision-making process.

The main objective of this research is to propose a methodology (not a new performance measurement framework) that will support existing measurement framework(s) during the process of performance measurement systems' design, implementation and use, and to advance the decision-making process. Conforming to the most favoured approach, we have adopted the balanced scorecard, to explore the existence of *trade-offs* among measures within the *dynamic* nature of performance measurement systems that provide *predictive modelling* capabilities. The use of FCMs in the development of a Balanced Scorecard, will allow prospective decision-makers to incorporate their insights into the model. They may select the most preferable measures, add new ones, test the relationships between them, and visualise holistic outcomes.

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This paper consists of five sections. Section 2 provides a literature review and research background; Section 3 presents the proposed methodology. Section 4 discusses the applicability of the proposed methodology. Finally, Section 5 concludes this paper.

2. Literature review

Senge (1992) argues that, in today's complex business world, organisations must be able to learn how to cope with continuous change in order to be successful. In this changing environment, the need for adequate design, implementation and use of performance measurement systems, is greater than ever. Eccles (1991) claims that it will become increasingly necessary for all major businesses to evaluate and modify their performance measures in order to adapt to the rapidly changing and highly competitive business environment.

The introduction of a performance measurement system is based on a three-stage process: design, implementation and use. Failing to implement any of these stages will result into a non-robust performance measurement system. When attempting to improve organisational performance by utilising performance measurement systems a critical point is the selection of appropriate measures. Anticipating this, several approaches have been introduced (frameworks, criteria, etc.). However, in spite the availability of such approaches, the need to further research the area of performance measurement is necessary.

Several authors have recognised that much more has to be done in order to identify the relationships among measures (Bititci and Turner, 2000; Flapper, Fortuin, & Stoop, 1996; Neely, 1999). Kaplan, when interviewed by de Waal (de Waal, 2003), argued that cause-and-effect relationships should be tested further. Nevertheless, in almost all cases, organisations ignore the dynamic interdependencies and trade-offs among measures. Furthermore, criticism exists regarding performance measurement systems and their static nature. According to Kennerley and Neely (2002), consideration is being given to what should be measured today, but little attention is being paid to the question of what should be measured tomorrow. They suggest that measurement systems should be dynamic and must be modified as circumstances change. A radical rethink of performance measurement is now necessary more than ever (Corrigan, 1998; Takikonda & Takikonda, 1998). In an attempt to describe and test cause-and-effect relationships, Kaplan and Norton (2001) proposed the use of strategy maps. However, the causal relationships that strategy maps claim to model are not always linear and one-way (Kaplan and Norton refer only to linear and one-way cause and effect chain), but mostly a fuzzy mess of interactions and interdependencies.

Kellen (2003) argues that in the area of executive management only 6 in 10 executives place confidence in the data presented to them. He points out that one of the main factors that prevent measurement is the fuzzy objectives. By the same token, Xirogiannis, Chytas, Glykas, and Valiris (2008) explains that in a performance measurement system a large number of multidimensional factors can affect performance. Integrating those multidimensional effects into a single unit can only be done through subjective, individual or group judgement. It is impossible to have an objective measurement and scale system for each different dimension of measurement that can facilitate objective value trade-off between different measures. They argue that techniques, which are suited to fuzzy paradigms, should be considered.

Identifying the relationships and trade-offs that exist among measures will be a great step towards the design of a robust performance measurement system. However, the robustness of the performance measurement system is also based on its successful implementation and use. According to Neely et al. (2000), imple-

mentation is not a straightforward task due to fear/resistance, politics and subversion. Dumond (1994) claims that the main problems in the implementation of performance measurement systems are raised due to the lack of communication and dissemination of performance information. According to De Geus (1994) even a simplified but credible (causal) model can be a powerful communication and learning tool. In the same token, Morecroft (1994) argues that models are more effective when they become integral parts of management debate, communication, dialogue and experimentation. It is possible for managers to gain insights about how their actions might affect outcomes if they work with models. Furthermore, experimentation with models creates a cycle of increased learning and improved models.

Finally, further to all the aforementioned issues, Morris (2002) argues that software applications that have been developed so far, lack of an analytic capability and they cannot carry out predictive modelling. Despite the many attempts in this area (EIS, Decision Support tools), it is claimed that these tools do not necessarily advance the decision-making process.

2.1. Balanced scorecard

According to Kaplan and Norton (1996a), the balanced scorecard supplements traditional financial measures with criteria that measure performance from three additional perspectives—those of customers, internal business processes, and learning and growth (Fig. 1).

- Customer perspective

Since companies create value through customers, understanding how they view performance becomes a major aspect of performance measurement.

- Internal business process perspective

According to Kaplan and Norton (2000), in the internal-business-process perspective, executives identify the critical internal processes in which the organisation must excel.

- Learning and growth perspective

According to Kaplan and Norton (2000), this perspective of the balanced scorecard identifies the infrastructure that the organisation must build to create long-term growth and improvement. Learning and growth come from three principal sources: 1. People; 2. Systems; and 3. Organisational procedures.

- Financial perspective

Within the balanced scorecard, financial measures remain an important dimension. Financial performance measures indicate whether a company's strategy, implementation, and execution are contributing to bottom-line improvement.

- Limitations of the balanced scorecard

Balanced scorecard (Kaplan & Norton, 1992), briefly described previously, is the most popular framework in the area of performance measurement. The introduction of the balanced scorecard was mainly based on a transition from the traditional financial performance measurement systems towards a more balanced approach (financial and non-financial measures) that includes several measures in a multi-dimensional structure. In spite of its "reputation", there are several issues related to the balanced scorecard, which need further research. More particularly:

- Cause and effect consider to be one-way in nature

The cause and effect concept is a very important element to consider in an attempt to construct a Balanced Scorecard. However, the way cause and effect is illustrated is rather problematic. Measures in the balanced scorecard are placed in a cause and effect chain rather a systemic approach. Kaplan and Norton (1996b) argue that '*the financial objectives serve as the focus for the objectives and measures in all the other scorecard perspectives*'.

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