

# Article Title Page

## The Role of Causal Links in Performance Measurement Models

### Author Details:

Author 1 Name: Yulia Kasperskaya  
Department: Dept of Economics and Business Organisation  
University: Universitat de Barcelona  
Town/City: Barcelona  
State (US only):  
Country: Spain.

Author 2 Name: Michael Tayles  
Department: Business School  
University: University of Hull  
Town/City: Hull  
State (US only):  
Country: UK

**Corresponding author:** Michael Tayles  
**Corresponding Author's Email:** m.e.tayles@hull.ac.uk

*NOTE: affiliations should appear as the following: Department (if applicable); Institution; City; State (US only); Country. No further information or detail should be included*

### Acknowledgments (if applicable):

The authors thank the constructive comments provided by two anonymous reviewers and the financial support for presenting this paper at conferences provided by Spanish research grants ECO2010-22105-C-03 and SEJ2006-13537/ECON

### Biographical Details (if applicable):

[Author 1 bio]

Dr Yulia Kasperskaya is a Visiting Professor at the Universitat de Barcelona, Spain. Her research interests are in managerial accounting and performance measurement with particular reference to the Public Sector.

[Author 2 bio]

Dr Mike Tayles is Professor Emeritus in Accounting and Finance at the University of Hull UK. His research interests are in Cost System Design, Strategic Management Accounting and Accounting for Intellectual Capital

### Structured Abstract:

**Purpose:** Several well-known managerial accounting performance measurement models rely on causal assumptions. Whilst users of the models express satisfaction and link them with improved organizational performance, academic research, of the real-world applications, shows few reliable statistical associations. This paper provides a discussion on the 'problematic' of causality in a performance measurement setting.

**Design/methodology/approach:** This is a conceptual study based on an analysis and synthesis of the literature from managerial accounting, organizational theory, strategic management and social scientific causal modelling.

**Findings:** The analysis indicates that dynamic, complex and uncertain environments may challenge any reliance upon valid causal models. Due to cognitive limitations and judgmental biases, managers may fail to trace correct cause-and-effect understanding of the value creation in their organizations. However, even lacking this validity, causal models can support strategic learning and perform as organizational guides if they are able to mobilize managerial action.

**Research limitations/implications:** Future research should highlight the characteristics necessary for elaboration of convincing and appealing causal models and the social process of their construction.



Type header information here

**Practical implications:** Managers of organizations using causal models should be clear on the purposes of their particular models and their limitations. In particular, difficulties are observed in specifying detailed cause and effect relations and their potential for communicating and directing attention. They should therefore construct their models to suit the particular purpose envisaged.

**Originality/value:** This paper provides an interdisciplinary and holistic view on the issue of causality in managerial accounting models.

**Keywords:** Performance Measurement, Balanced Scorecard, Cause and Effect, Strategy, Mapping

**Article Classification:** Conceptual Paper

---

*For internal production use only*

**Running Heads:**

Type footer information here

© Emerald Group Publishing Limited

This is a pre-print of a paper and is subject to change before publication. This pre-print is made available with the understanding that it will not be reproduced or stored in a retrieval system without the permission of Emerald Group Publishing Limited.

## **The Role of Causal Links in Performance Measurement Models**

Yulia Kasperskaya

Department of Economics and Business Organisation

Universitat de Barcelona

Barcelona, Spain

Michael Tayles\*

University of Hull Business School

Hull, United Kingdom

[m.e.tayles@hull.ac.uk](mailto:m.e.tayles@hull.ac.uk)

*\* Corresponding author*

The authors thank the constructive comments provided by two anonymous reviewers and the financial support for presenting this paper at conferences provided by Spanish research grants ECO2010-22105-C-03 and SEJ2006-13537/ECON

## **Abstract**

**Purpose:** Several well-known managerial accounting performance measurement models rely on causal assumptions. Whilst users of the models express satisfaction and link them with improved organizational performance, academic research, of the real-world applications, shows few reliable statistical associations. This paper provides a discussion on the ‘problematic’ of causality in a performance measurement setting.

**Design/methodology/approach:** This is a conceptual study based on an analysis and synthesis of the literature from managerial accounting, organizational theory, strategic management and social scientific causal modelling.

**Findings:** The analysis indicates that dynamic, complex and uncertain environments may challenge any reliance upon valid causal models. Due to cognitive limitations and judgmental biases, managers may fail to trace correct cause-and-effect understanding of the value creation in their organizations. However, even lacking this validity, causal models can support strategic learning and perform as organizational guides if they are able to mobilize managerial action.

**Research limitations/implications:** Future research should highlight the characteristics necessary for elaboration of convincing and appealing causal models and the social process of their construction.

**Practical implications:** Managers of organizations using causal models should be clear on the purposes of their particular models and their limitations. In particular, difficulties are observed in specifying detailed cause and effect relations and their potential for communicating and directing attention. They should therefore construct their models to suit the particular purpose envisaged.

**Originality/value:** This paper provides an interdisciplinary and holistic view on the issue of causality in managerial accounting models.

**Keywords:** Performance Measurement, Balanced Scorecard, Cause and Effect, Strategy, Mapping

**Article Classification:** Conceptual Paper

## 1. Introduction

Performance measurement models similar to the Balanced Scorecard represent one of the most important managerial innovations of recent years (Otley, 1999). Substituting traditional performance measurement systems, causal performance measurement models<sup>1</sup> (PMMs) are meant not only to measure and control but also guide companies' performance. For the latter purpose, the company's strategy is translated into a set of quantifiable 'cause-and-effect' linkages including both financial and non-financial indicators representing value creating activities and their outcomes (Kaplan and Norton, 2001b).

Whilst being central to the causal PMMs, such as the Balanced Scorecard, the assumption of quantifiable and predictable causal links appears to be problematic in real-life applications (Malmi, 2001; Malina et al., 2007). On the one hand, most of the empirical academic studies show no reliable statistical associations between non-financial indicators and financial outcomes. On the other hand, many of the users of the causal PMMs have associated these models with improvements in perceived organisational performance (Ittner et al., 2003; De Geusier et al., 2009).

These controversial findings served as the motivation for our work. If academic research has shown that the causal links in PMMs are weak, why is it that these models are still heavily used in practice? That is, if the prevalence of reliable quantifiable links is so rare in complex and dynamic business environments why do causal PMMs continue to be so popular and attractive to their users?

The objective of this paper is to analyse these possibly conflicting properties of causal PMM system design and the implications they may have for organisational decision making. The work contributes to existing accounting literature in this area, which so far is quite fragmented, by making a synthesis and analysis of the existing studies on implementation of causal PMMs. To help explain our analysis, we adopt an interdisciplinary focus and analyse academic studies from perspectives of managerial accounting, organisation theory, strategic management and social scientific causal modelling, and relate them to causal PMMs. The paper will therefore prompt the users

---

<sup>1</sup> Other definitions are also applicable to these models such as multidimensional performance measurement models, strategic managerial accounting systems.

of causal PMMs to reflect on the role which causal models play in their organisations, if necessary to modify their approach to the models, to be more aware of their limitations, and thus may facilitate the extraction of greater value from the models.

The structure of the paper is explained below. In Section 2, we shall briefly overview PMMs with particular reference to the Balanced Scorecard model because this is the most prominent model and has received the greatest research focus. Then in Section 3, we clarify causality and review the contemporary practitioner-oriented literature and academic accounting studies on causal PMMs. Section 4 will explore the causal properties of PMMs from an interdisciplinary point of view. In Section 5, we summarise and synthesise our findings, arguing that “true” causal links are unstable and difficult to trace, but even if causal links are lacking validity, when it comes to clarifying and communicating strategic vision, they can be efficient story-tellers. We then draw out some of the implications of our analysis, the questions it raises and offer suggestions for future research.

## **2. PMMs and the Balanced Scorecard**

The Balanced Scorecard (BSC) is, perhaps, the most popular and widely known among causal performance measurement approaches<sup>2</sup>. Recent surveys conducted on the topic of the BSC implementation revealed that approximately half of the larger companies in the USA and Western Europe use its framework<sup>3</sup> in some way (Russell, 2003). According to the surveys undertaken by consulting company Bains & Company (2011) the BSC model is consistently ranked as one of the most pertinent and popular management tools and the rate of satisfaction of users between 1996 and 2010 has been around ‘4’ on a 5-point scale.

It was developed by the academics and consultants Robert Kaplan and David Norton, after they conducted research in several American companies, and presented first in 1992 (Kaplan and Norton, 1992). A series of subsequent publications refined the BSC

---

<sup>2</sup> Other documented approaches are The Tableau de Bord (Bourguignon et al., 2004) and the Action Profit Linkage Model (Epstein and Westbrook, 2001).

<sup>3</sup> We shall point out later that there is evidence of some companies claiming to have a Balanced Scorecard, yet on closer examination this has been questionable.

concept and put it in the centre of strategy -making (Kaplan and Norton, 1996a, 1996b, 2001a, 2004).

Once a company defines its strategic vision it should translate it into a strategy map (Kaplan and Norton, 2001b). A strategy map visualises and communicates a strategy via hypothesised cause-and-effect links between value-creating activities and desired strategic outcomes. Relationships, included in a strategy map, are quantified with indicators chosen from four major organisational perspectives: Learning and Growth, Customers, Internal Business Processes, and Financial<sup>4</sup>.

Selected indicators are linked in a cause-and-effect chain. Some of them serve as lead indicators, driving a certain activity of the company. Others perform as lag indicators, signalling about the outcome of this activity. For instance, if the order execution time is a lead indicator, the increased turnover is a lag one. If the company directs its effort to the shortening of order execution time, it is assumed it will attain an increased turnover. Through these causal relationships, the indicators not only measure certain factors in isolation but also tell a story about how value is created in order to fulfil strategic objectives. The idea to convert strategy into a set of plausible and coherent causal relationships between leading and lagging indicators constitutes the essence of the BSC philosophy. Furthermore, targets should be set for the indicators selected by a company and incentive schemes tied to the realisation of these targets. In this way, the managerial effort and attention will be directed towards the critical issues for accomplishing the organisation's goals.

Linear cause-and-effect chains are a powerful element of the architecture of this model. They claim to demonstrate how desired results can be achieved and where the company should concentrate its efforts and investments. In this respect, the model assumes that both company activities and the external environment are to the greater degree controllable, measurable and predictable. Engaging in active learning and measurement procedures, they claim that companies can execute ambitious strategies and constantly improve their market position. The philosophy of "achievement", "best results",

---

<sup>4</sup> The canonical form of the BSC includes four perspectives, but the number and content of the perspectives can be adjusted for particular organizational contexts. For instance, the Supplier perspective or an Environmental perspective can be found in a number of known BSC applications.

“excellence”, and “superior profitability” underpins the causal performance measurement movement.

### **3. The concept of causality**

The BSC model does not contain an explicit definition of causality; however it calls for use of statistical techniques in order to validate causal beliefs of managers formulated in the model, suggesting that indicators of hypothesised causal links have to be significantly correlated. Criticising the BSC assumption of causality, Norreklit (2000) refers to causality requiring events to be observed and proven empirically, containing a well-defined temporal lag with the relationship being distinct from a logical one. Following this, she points out that empirical evidence on BSC causality links is scarce and mixed (see also Norreklit and Mitchell, 2007); the time dimension is not specified in the model design; and the relationships among perspectives are more likely to be logical in their nature. In other words, the causal links in PMMs are in fact more expressions of managerial beliefs about means needed to achieve specific strategic ends.

Causality is a notoriously elusive phenomenon; for example, the complexity of the business environment also implies that a relationship found to apply at one time and under a given set of conditions will not necessarily be observed in the future or under another set of conditions. Therefore, if the possibility of causal relationships is acknowledged in a managerial context, it cannot be treated as continuous, unambiguous and exception-free in its nature, but rather considered probabilistic (Pearl, 2000). The norms of probabilistic causation imply that a given cause will not necessarily produce a specified effect and a given effect can be produced by another cause. So customer loyalty programs will not always boost customer satisfaction and satisfied customers will not necessarily drive up company sales. Yet, managers could assume that satisfied customers are more likely to repeat a purchase. An important caveat here is that none of the causal PMMs refers to probabilistic causation principles, and furthermore statistical correlations between performance measures are not sufficient to claim causality.

#### **3.1. Practitioners’ literature on causal PMMs**

Causal PMMs are a very popular topic in practitioners’ business publications, often using anecdotal evidence of considerable success, and thus contributing to the enthusiasm regarding causal models (see for example, Eccles, 1991, Magretta, 2002,

Crosby and Sheery, 2006). The causal performance measurement movement is spreading over the world through numerous practitioners' conferences and seminars, with consulting companies actively selling and propagating causal PMMs, especially the BSC<sup>5</sup>. The following citation from one practitioners' journal is characteristic of it:

Causal relationships among PMM measures are an important design criterion and feature of a successful customer loyalty strategy. Conversely, a PMM without valid causal relations is ineffective or counterproductive to communication and motivation. (Crosby and Sheery 2006, p.13)

Rucci et al. (1998), Kaplan and Norton (2001b, pp.309-311) describe the business model of Sears Roebuck Company, which is built upon the assumption of existence of causal linkages, going from employee attitudes through customer satisfaction to profits<sup>6</sup>. Epstein and Westbrook (2001) describe causal business models implemented by the Canadian Imperial Bank of Commerce (CIBC) and the Browning Ferris Industries (BFI)<sup>7</sup>.

Despite being very encouraging, the stories of Sears, CIBC and BFI companies are not conclusive. Probably for confidentiality reasons, no information is disclosed in the above cited articles, and this limits a proper scientific judgement of the exposed evidence. Furthermore, Ittner and Larcker (2003) report that among 157 companies they surveyed, only 23% consistently built and verified causal models. Yet, this limited number of companies, on average, had higher ROA and ROE than companies that did not use causal models.

---

<sup>5</sup> A search on Google about the BSC will give over 5 million links

<sup>6</sup> On the basis of statistical elaboration of the collected data, Sears came up with the following cause and effect chain: 5 points improvement in employee attitudes drives 1.3 points of increase in customer satisfaction, which in turn drives up 0.5% of the revenue. Sears claims that after implementing the model, customer satisfaction increased by 4%. This resulted in \$200 million increase in revenues.

<sup>7</sup> The CIBC managers arrived at the following model: a 5% increase in employee commitment, drives a 2% increase in customer loyalty, which results in 72\$ annual increase in customer profitability. Similarly, in BFI, (which in the past faced the problem of high customer-defection) causal analysis allowed it to detect the drivers of customer satisfaction. The investment programs aligned with the results of causal analysis brought a 3% decline in customer-defection rate. The latter had a profound impact on company profitability.

### 3.2 Academic literature on causal PMMs

Academic literature provides mixed and contradictory evidence on causal PMMs<sup>8</sup>. It is not at all clear whether PMMs deliver the promised economic and financial improvements. According to Ittner and Larcker (2008) many of the papers, which study empirically the association between the usage of performance measurement models and economic returns, suffer from serious methodological errors. Ittner et al. (2003), in their extensive survey of the financial services industry, found a positive association between BSC usage and ‘perceived organisational performance’ but a negative association with its ‘financial performance’. Similarly, Malmi (2001) indicates that all interviewees in his study had a positive attitude toward their BSC; however the effects of using the models were not quantified. He conducted interviews on the BSC implementation with the managers of seventeen Finish companies and points out that most of the interviewees misunderstood the cause-and-effect logic. Specifically, some of the companies replied that “we do not know how much some factors and measures affect other factors and that there might be a chance to establish such relationships in future” and “we are not so far along yet” (Malmi, 2001, p. 210). The managers interviewed perceived the BSC perspectives independently from each other. Malmi suggests further research needs to be done on cause-and-effect weaknesses of the BSC applications.

It seems that most of the companies experience difficulties developing and testing causal links. Ittner and Larcker (2003) pointed out that among the diverse US companies that they surveyed only 30% developed formal business models and tested causal links. Papalexandris et al. (2004) report that after implementing the BSC in a large software company in Greece, the strategic objectives which managers perceived as strongly correlated appeared to be uncorrelated. However, Cohen et al. (2008) found evidence to support the hypothesis that there is some sequential dependency among non-financial BSC perspectives.

Malina et al. (2007) describe the process of building a causal PMM designed in a large American company for tracking the performance of distributors. Managers of this company believed in numerous cause-and-effect relationships postulated in the model.

---

<sup>8</sup> Most of the studies undertaken are related to the BSC

However, statistical tests of hypothesised causal relationships demonstrated that only a few of them were significant and overall the model had no predictive ability. The authors were puzzled with their findings because apparently the model was still used for strategic communication, the setting of incentives in the company and managers were globally ‘satisfied’ with it.

Luft (2004) indicates that, in reality, most of the applications are causally weak and hypothesises several reasons for such “weaknesses”. In particular, these are the high cost of the analysis, uncertainty of the processes of value generation and conflicting views which managers may have on “true” cause-and-effect relationships. Otley (1999) considers the causal assumption of the BSC simplistic: “...a linear chain is suggested whereby better trained employees in the Innovation, Learning and Growth category will lead to better business processes being designed (one input to such changes, but surely by no means the only one); these in turn will lead to more satisfied customers and then to happier shareholders. Although a plausible chain of events, it is again very much a simplification of reality” (Otley, 1999, p.375).

In summary, relatively few companies engage in formally testing their causal models, finding the hypothetical causal links either self-evident, or such analysis much too complex. Very few academic studies, which have attempted statistical analysis on hypothetical causal links, establish causality. Notwithstanding this, most of the users of advanced PMMs express their satisfaction and perceive improvements in organisational performance associated with the usage of PMMs. How is it that academic research has shown that the causal links of PMMs are weak, yet these models are still used in practice? How can we explain and reconcile this tension? The apparent controversy, which the studies convey, leads us to analyse the main factors, which may impede construction of a valid causal PMM. We shall proceed to explore this from a number of perspectives.

#### **4. An interdisciplinary view of causal links of PMMs**

##### **4.1 Organisation Theory: uncertainty and the role of accounting models**

The overview of causal PMMs suggests that these models are aimed to help set clear and definite goals for organisations, measured by explicit standards. Therefore, such

models allow for the possibility of exerting control and influence over the internal and the external organisational domains. In the context of organisation theory, ‘closed systems’ and ‘open systems’ are well known (Thomson, 1967). Closed-system logic refers to a deterministic system with complete knowledge about cause-and-effect relationships in its structure. This originated in the Scientific Management Movement, which dates back to the Taylorist theory at the beginning of the last century and is based on the notion of rational resource allocation fitting a master plan. In contrast, open-system logic views organisations as natural systems, as parts of a wider social and economic system, having its own dynamic and often unpredictable outcomes.

“Closed-system” strategists think about organisations in terms of rational pursuit of optimal targets and maximising results. “Open-system” strategists are just interested in naturalistic organisational behavior. Both approaches are at times relevant, since much of organisational action is “purposeful and rational”, but at the same time, part of it resides in informal interaction, is unpredictable and is heavily dependent on the external environment.

Administrative theory distinguishes three levels of responsibility and control in organisations, namely, technical, managerial and institutional. The technical level comprises controls directly related to the production tasks in organisations. The managerial level provides services for the technical level, and interacts with the external environment, undertaking selling and procurement activities. The institutional level encompasses rules and norms of the external environment. Only the technical level can approximate a closed system, where all the relevant variables and their interrelationships are known. The managerial level interacts with the institutional level and therefore it can be influenced by the external environment and thus rarely can it resemble a closed system. The institutional level is the one, which brings even more uncertainty and unpredictability, since organisations have no formal control and influence in this domain. In his seminal work on Organisation Theory, Thomson (1967, p10) observed “The fact is, that our culture does not contain concepts for simultaneously thinking about rationality and indeterminess”. We shall now consider the implications of this for managerial decision-making and performance measurement.

All organisations seek to plan their future and evaluate their performance. In doing this, they would prefer clear and unambiguous assessment of efficiency over other types of assessment. However, the usage of explicit assessment of efficiency may be appropriate mostly for closed-systems where complete knowledge of cause-and-effect relations exist. At different organisation levels and faced with different degrees of uncertainty about the environment, different decision strategies are appropriate.

How does this apply to accounting practice? Following the above ideas about the variety of decision strategies in organisations, Burchell et al. (1980) apply them to accounting practices, suggesting that accounting practices may play different roles depending on the degree of uncertainty of cause-and-effect and organisational objectives (See Table 1).

**Table 1 Uncertainty, decision making and the roles of accounting practices**

		Uncertainty of objectives	
		Low	High
Uncertainty of cause and effect	Low	<i>Answer machines</i>	<i>Ammunition machines</i>
	High	<i>Learning machines</i>	<i>Rationalisation machines</i>

Adopted from Burchell, S., Clubb, C., Hopwood, A.G., Hughes, J. and Napiet, J. 1980 "The role of Accounting in Organisations and Society, *Accounting, Organisations and Society*, Vol. 5, No. 1, p. 14

When uncertainty of cause-and-effect is low and objectives are clear, accounting techniques can act as "answer machines". Involving computation and formulas, they produce reliable solutions and give accurate feedback. When uncertainty of cause-and-effect is high accounting systems would perform as "learning machines". Organisational actors then need to formulate hypotheses, analyse, and make judgments. Low uncertainty about cause-and-effect and unclear objectives, means that different organisational actors and groups hold conflicting views on organisational goals. Then, accounting models are employed as "ammunition machines", defending different policies and advocating interests. High uncertainty about cause-and-effect and objectives can lead to situations where accounting models play the role of "rationalisation machines". In other words, they are employed for creating meaning and portraying organisational rationality.

To summarise, managing in organisations is a constant balancing between formal and rigid control structures and flexible and open systems. Yet fundamentally, causal performance measurement models belong to the family of rationalised managerial techniques, encompassing the logic of closed systems. However the architecture of the causal PMM encompasses all three levels of control, technical, managerial, and institutional. It can be expected that major problems with the model's reliability will appear when dealing with their external domain, such as customer, supplier and institutional relationships, technological change etc. These are the areas which are not easily measurable and predictable. When the knowledge about cause-and-effect relations is certain and the environment is stable and predictable, causal PMM can potentially play the role of answer machines. However, in dynamic and complex environments, the deterministic cause-and-effect assumptions have to be relaxed; can the model be used rather for "learning", or as "ammunition" or a "rationalisation" device?

## **4.2 Strategic Management: are Causal PMMs "blindness" or strategic learning tools?**

### **4.2.1 The Causal PMM and prescribing the strategy**

From the perspective of strategic management, causal PMMs represent analytical tools, which support formulation and implementation of strategy. They can perform as decision aids within what Mintzberg et al., (2005) defined as the Prescriptive School of strategy. The Prescriptive School includes the Design, Planning and Positioning School. The Design School is famous for its SWOT technique. The Planning School brought to the managerial agenda the idea of detailed planning, the quantification of various objectives and targets and its culmination in a Master Plan. The Positioning School is based on industrial analysis involving generic market strategies and value chain analysis. Kaplan and Norton (2004) suggest that SWOT and industry analysis can be used as the first step of BSC design.

The Prescriptive School assumes that strategy formation is a deliberate, conscious and controlled process, supported by rational, analytical and calculative techniques. Assisted by planners and analysts, chief executives bear the main responsibility for strategy formation, which must be formulated, formalised and made explicit before its

implementation (Mintzberg et al, 2005). A critique levelled at the prescriptive approach is that it is built on the ambitious assumption that the environment can always be understood, currently and for periods well into the future; and that the environment itself is sufficiently stable, or at least predictable, to ensure that the formulated strategies today will remain viable after implementation. Further, the prescriptive approach to strategy separates thinking and action. First, the strategy is conceived and then it is implemented. As such, it ignores the possibility for strategy to be emergent and incremental. In the pursuit to make strategy explicit in organisations, inflexibility may be promoted, and learning may be suppressed. “Moreover, even when uncertainty is low, the danger of articulating strategies must still be recognised. Explicit strategies are blinders<sup>9</sup> designed to focus direction and so to block out peripheral vision. They can thus impede strategic change when it does become necessary” (Mintzberg et al., 2005, p.36).

Another danger stems from a reliance on “hard” data in prescriptive strategy formulation because hard information is lacking contextual richness; it does not include gossip, rumour and intuition. Additionally, “hard” data may arrive late, be unreliable and cannot be easily aggregated. So, when it arrives to top managers it can give a distorted or incomplete picture of reality.

Several studies have revealed the problems resulting from the deterministic nature of causal PMMs. Voelpel et al. (2006) argue that the BSC framework is too static and rigid and does not accommodate the vision of those companies which rely on networking with collaborators and suppliers in their value creation. Laitinen (2004) developed a microeconomic model, which shows that with the change of strategy, the causal links may give a confusing signal to the users of the BSC<sup>10</sup>. Kasurinen (2002) describes a failed attempt to implement the BSC in a strategic business unit of a multinational Finland-based group. One of the major obstacles to successful

---

<sup>9</sup> Mintzberg uses ‘blinders’ but some may prefer ‘blinkers’, as on a horse, used in this case to ensure its vision is narrowed.

<sup>10</sup> When Nokia changed its strategic focus from profit growth to revenue growth, all the non-financial indicators leading to higher profitability were positive. However, contrary to the modelled relationships, profitability indicators declined since prices decreased significantly as Nokia increased its volumes (Laitinen, 2004).

implementation was the difficulty of selecting a unique strategy. According to the managers of this business unit, a variety of products, which could not be classified into the specific market niche and a large number of small customers, acted as a challenge to the strategy formulation.

In summary, representing the analytical tools of the prescriptive school of strategy, causal PMMs are open to the criticism of being inflexible and unfriendly to the incremental, informal and participative approaches to strategy making. Thus one of the major premises of the causal PMM, to formulate and describe the strategy through the causal links, can be challenged by strategic uncertainty, difficulties in elaborating a unique strategy, and possible conflicts between equally important strategic goals. However, can PMMs still contribute to strategy development?

#### **4.2.2 Causal PMMs as a strategic learning tool**

Despite the above criticism, Kaplan and Norton (2004) maintain that the BSC framework can be used for strategic learning and indicate that some companies modified and attenuated their strategies through constructing and testing their strategy maps. Kaplan (2009) suggests that in order to achieve greater strategic alignment an organisation's BSC has to be employed as an interactive control system. This is in addition to the diagnostic control systems, "which are used to motivate, monitor and reward achievement of specific goals" (Simons, 1995, p.7), steps which initially received comprehensive coverage in the early BSC approach.

In his theory of levers of control, Simons (1995) defines an interactive control system as the one, which is "used to stimulate organisational learning and the emergence of new ideas and strategies" (p.7). These systems connect in their meaning with the "learning machines" of Burchell et al. (1980) Table 1 above. Kaplan (2009) maintains that the BSC fits neatly into the definition of an interactive control system. Its implementation and usage requires active involvement of the CEO, attention from operational managers at all levels of the organisation and continuous debate and discussion of the data collected, which may possibly lead managers to question and modify strategy.

Supporting this idea, Tuomela (2005) reported the case of the implementation of a PMM, containing causal links between strategic objectives. He describes the interplay

of diagnostic and interactive properties of the BSC during its implementation and points out that, in particular, managers were engaged in a dialog about strategic uncertainties, and cause-and-effect hypotheses were established based on managerial reasoning. De Geusier et al. (2009) surveyed 73 business units of diverse European companies which implemented the BSC. They concluded that perceived organisational performance improved due to the better translation of the strategy into operational terms and the fact that strategising becomes a continuous process with greater alignment of processes and units in organisations.

We shall return later, in section 7, to develop discussion of the support for strategy from PMMs, but first will address more broadly the role of ‘causal modelling’ in the social sciences.

#### **4.3 Social scientific causal modeling**

Causal modelling has a long-standing research tradition in the social sciences. Human understanding of a particular problem can be represented in the form of a mental model which we hold about issues and relationships. This can be represented visually by drawing a key set of variables (mental concepts) and interrelationships between them. Often, such modelling involves the construction of a causal map (Huff, 1990), which contains a set of variables (concepts) linked by causal beliefs or assertions explaining the relationships between the variables.

In fact, a strategy map of a BSC is an example of a collective causal model, elaborated by a group of top managers; such a model represents a company’s strategic objectives linked causally. Causal mapping techniques are actively employed by researchers of strategic management<sup>11</sup>. Some of the findings in this area can be relevant for explaining the “weaknesses” of real- life causal PMMs.

Hall (1984, 2002) applied causal modelling to business policy decisions, he points out that causal maps are a group effort of a ‘dominant coalition in the organisation’. In his

---

<sup>11</sup> For a comprehensive overview of the techniques see *Mapping Strategic Knowledge*, Huff and Jenkins, Eds., 2002.

study of the business policy of a curling sports club he developed<sup>12</sup> a map (Hall, 2002) of *policy variables*, *intervening variables* and *goal variables*. In this relatively simple sports club, the map contained 24 direct causal influences among 15 active variables representing chains of cause-effect in the club's operations. The map contains 21 chains of influence (paths) and 8 feedback loops.

Feedback loops can be particularly problematic; these are the circular paths of cause-and-effect. They can lead to unpredictable results if they go unnoticed (Hall 2002, Huff, 1990). In other words, they can confound simple cause-and-effect logic<sup>13</sup>. Positive causal feedback loops can lead to change and uncontrolled growth in variables and may result in problems for managers. For instance, the number of members in sports club may grow exponentially if some of the members bring their relatives and friends, and these in turn will invite their friends. This exponential growth may result in bottlenecks in sports club facilities. Possible problems here is that circular causal paths are largely ignored by managers (Hall, 2002) and in large companies, the results of causal modelling are likely to be significantly more complex and voluminous in comparison with the sports club example presented. "This is not the stuff for the action-oriented managers who wish to make quick decisions and get on with other things" (Hall, 2002, p. 105).

In his book "The Fifth Discipline. The art and practice of the Learning Organisation," Senge (1990) maintains that thinking based on causal linearity is deeply embedded in our language and the mental models we create. "Contemporary research shows that most of our mental models are systematically flawed. They miss critical feedback relationships, misjudge time delays and often only focus on variables that are visible or salient" (Senge 1990, p. 203). At the same time, many business situations can be defined as situations of dynamic complexity, i.e. balancing market growth, capacity extension, developing a profitable mix of products and prices etc. According to Senge, circular, instead of linear, reasoning may greatly benefit managers.

---

<sup>12</sup> Hall interviewed the elite of sports club and then applied an Artificial Intelligence method to select the relevant variables. Scientific causal modelling may also employ interviewing, imagining, the use of images and storytelling by key organizational authors.

<sup>13</sup> The notion of feedback loops occurs in cybernetics. For more on feedback loops, see Morgan, G. (1997).

Further shortcomings of causal maps are that causal linkages are assumed monolithic, that is, without time delays and disruptions, though this can be significantly different from reality (Huff, 1990). Furthermore a causal map elaborated by a group is subject to all types of individual judgmental biases. For instance, when making judgments, people were shown to underestimate uncertainty and base their judgment on non-existent causal relations<sup>14</sup>.

How can the evidence described above be interpreted in the light of the causal PMM? If done in a rigorously scientific way, this exercise can be very time and effort consuming. Large companies and complex environments would include many boxes and causal linkages in their models and have to account for possible time delays, circular relationships and disruptions. The BSC and other models mentioned in Section 2 rely on linear causal logic and largely ignore or give little attention to the existence of circular causal relationships. In addition, all causal PMMs recommend the inclusion of a limited number of performance indicators and objectives. While being a reasonable element of the design of “workable” and comprehensible PMMs, this inevitably abstracts models from reality. There is little doubt that causal PMMs can serve as a superior information and control tool in comparison to traditional managerial control systems. The question is the extent to which it is feasible to trace any accurate, complete and comprehensive cause-and-effect understanding of the environment into the PMM, and if this is not the case what role causal links in PMMs may play.

#### **4.4. Causal PMMs as organisational guides**

The previous sections of analysis express a rather cautious and sceptical view on the potential of causal PMMs to objectively evaluate and “drive” organisational performance. It is legitimate, then, to ask how do organisations, act and learn if they are often guided by inaccurate models and limited assumptions about their environment?

Weick (2001) argues that there are two major organisational solutions for coping with complex and uncertain environments. The first one consists of investing considerable time and effort in evaluating all the possible scenarios and their outcomes. Engaging in

---

<sup>14</sup> For a list of decision making biases relevant to strategic judgement see Makridakis, 1990, p.36-37

rational decision processes, organisational actors should consider as much detail as possible and carefully evaluate the various alternatives. However, this approach is costly and may lower the motivation needed for the implementation of the chosen alternative. The other possibility is, neglecting the “subtle nuances”, simplify the reality, make a crude picture of it and concentrate the efforts on the action rather than the decision.

The advantage of the second approach consists not only in the potential savings of organisational resources, but also that many managerial actions align with the notion of self-fulfilling prophecies. This is to say, even if the interaction of the organisation with the environment is estimated wrongly, initially; it may become appropriate in the future (Weick, 2001). Prophecies (expectations or predictions made by managers) impact behaviour, mobilise action and in this way may come to realisation. A parallel can be drawn with regard to causal PMMs. Even if the models are built on the unproven assumptions and predictions (prophecies), they can be significant, if they can mobilise organisational action.

Weick (1990) described how a small Hungarian military detachment, which lost its way due to the snowstorm in Alps, managed to navigate its way out, but only later realised they navigated using a map of the Pyrenees. The moral of this story has important implications for organisations. On some occasions, it does not matter how accurate the map is. Strategic plans, business models, causal maps can serve as important “binding mechanisms”. If perceived as credible, they can impose order, influence actions and help to elaborate and motivate organisational direction and identity.

“The important feature of a causal map (or any map) is that it leads people to anticipate some order *out there*. It matters less what particular order is portrayed than that an order of some kind is portrayed. The crucial dynamic is that prospect of order lures the manager into ill-formed situations that then accommodate to forceful actions and come to resemble the orderly relations contained in the causal map. The map animates managers, and the fact of animation, not the map itself, is what imposes order on the situation.” (Weick, 1990, p.7).

According to Weick and Bougon (2001, p. 323) causal maps “should exert influence when a situation is non-routine and requires something more than standard operating procedures. Maps will have more effect when key authors are relatively free of organisational constraints, when overload necessitates simplifying strategies, when stress impairs the performance of cognitively complex tasks, and when ambiguity is high”.

Maps may contain inconsistent and equivocal relationships, yet they may be valuable tools for construction of meaning and communication in organisations because they assimilate uncertain events into a structure and generate meanings for the event. The causal map contains the structure, the process, and the material from which agreements and conflicts are built when people coordinate action. Thus, even being crude pictures of reality, maps can perform as guides, especially if the portrayed “territory” is unknown and complex. Returning to the possible roles of accounting practice described in Table 1 above (Burchell et al. 1980); Weick and Bougon’s “guides” would in this case correspond to the “rationalisation machines”. Both lines of reasoning converge on the idea that the accounting models can create meaning and portray organisational order.

The success of the BSC is due in part to the extensive use of graphical representations to illustrate its key ideas (Norreklit, 2003). Cooper et al. (2012) argue that introduction of causal maps and usage of graphical information in the BSC framework was a very important step in popularising this approach and enhancing the rhetorical power of the framework. The more complex the set of relationships, the more useful it is to graphically depict them using arrows to connect the boxes. In theorisation, graphics are powerful in delineating patterns and introducing causality. A visual representation is argued to increase the readers’ comprehension.

Experimental studies also report that causal representation of information in PMMs facilitates strategic understanding. Webb (2004) investigated the importance of causal structure in the models of strategic performance measurement. He demonstrated that well-articulated causal links help organisational actors to understand the mechanisms by which corporate objectives can be achieved. Better understanding of the goals leads to

greater commitment by managers to achieve them. Hypothetically, then, a causal model has advantages over ordinary scorecards.

Vera-Muñoz et al. (2007) demonstrated in their experiments that accountants prompted with causal business models made better decisions when allocating budgets between two alternative projects. Those participants who used causal business models were able to interpret data better and infer time-lagged causal relationships from it. Banker et al. (2011) conducted an experiment where participants used the BSC for performance evaluation of two hypothetical business units. The results show that those participants who were provided with causal maps in addition to narrative description of strategy placed greater weight to the indicators, linked with strategic objectives. The authors conclude that the BSC implemented with a causal strategy map can greatly reduce the cognitive complexity for decision makers and potentially serve as a communication tool.

Qu and Cooper (2011) described a longitudinal case study on the BSC development in the Canadian health-care service. They emphasised the importance of so called ‘inscriptions’, such as reports, flip-charts, memos and maps in the implementation process because they help to adapt a generic accounting model to the local setting. They point out that persuasiveness and simplicity is very important. “According to consultants in AB Consulting, one key advantage of graphical presentations is their ability to communicate and present complex information in a summary and clear fashion” (Qu and Cooper 2011, p.358).

Busco and Quattrone (2009) describe the case of BSC implementation in MEGOC, a large corporation, which operates in the oil and gas industry. They argue that the BSC can be viewed as a kind of rhetorical device because of its ability of organising, displaying and communicating knowledge. In particular, strategy maps helped actors to envisage the company mission and basic beliefs about strategic direction. Managers were engaged in the BSC implementation by “searching sound cause-and-effect relationships to feed a reliable strategy map” (Busco and Quattrone, 2009, p.20).

Thus, even inaccurate causal PMMs potentially may serve as guides in organisations. Causal arrows of PMMs capture strategic vision, and therefore can support

organisational sense-making as ‘rationalisation machines’. The concern about their truthfulness and validity here is not primary. Causal links may be a mere artefact, yet they have to be persuasive and appealing to managers. The most, important issue, perhaps, is how credible and convincing the story is behind the causal arrows. And whether the “prophecies” stated in the model could come to be realised through mobilisation of managerial commitment.

## 5. Summary and Conclusion

The objective of this paper was to discuss the ‘problematic’ of cause-and-effect chains in performance measurement. Causal PMMs are one of the important recent trends in managerial accounting, which have generated a great deal of interest from both practitioners and academics. Three of the known PMMs, the Balanced Scorecard, the Tableau de Bord and the Action-Profit Linkage model specifically rely on causal logic. The BSC was rated positively by managers, who perceived improvements in organisational performance associated with the usage of it in their organisations. However, most of the real-life applications appear to be causally “weak” and rigorous academic studies have shown limited support for robust quantitative cause-and-effect relations. We therefore posed the question if academic research has shown that the causal links in PMMs are weak, why is it that these models are still heavily used in practice?

In addressing this problem, an analysis of organisational theory draws attention to the importance of uncertainty both in external and internal organisational environments. Complete knowledge about cause-and-effect is hardly possible in complex, dynamic and uncertain environments. The latter, however, are the working conditions for most managers and companies today. In this case, causal deterministic PMMs may become unreliable and unrealistic. Tracing of ‘true’ cause-and-effect relationships will become very costly and resource-hungry. Besides, in order to keep in touch with reality, the models will require constant revision and adjustment which may prove to be unrealistic. All this may lead to the possibility for the causal PMMs to play roles different from those originally prescribed by their authors.

In strategy-making the role of causal PMM requires further research. On the one hand, conceptually the strategic management literature would place causal PMMs among the

prescriptive strategic approaches. This raises an important issue, which in part parallels the findings from organisational theory, that the assumption of predictability of the environment, which underpins causal PMMs, is ambitious. Furthermore, with regard to formalisation and quantification of strategy, rigid adherence to causal PMMs may undermine the informal and spontaneous emergence of strategy. An emphasis which the prescriptive school puts on the usage of “hard” data and quantification is also criticised for its potential danger of missing important “soft” information, such as gossip and intuition. On the other hand, the proponents of the BSC framework stress its ability to perform as part an interactive control system, activating strategic learning in organisations. Can PMMs therefore function as ‘learning machines’? If this is the case however, the structure of the model and the way it is developed and used must receive careful and detailed attention.

Findings from scientific causal modelling, point to the potential of this methodology for policy making in organisations. At the same time, they indicate that causal models simplify reality and their elaboration is subject to human cognitive limitations. Most managers don’t see circular causal relationships inherent in the nature of many business processes and none of the causal PMMs explicitly acknowledge their existence. The bigger and more diverse the organisation, the more causal arrows and boxes may be needed to capture its ‘true’ cause-and-effect structure and this could be problematic. Hence a comprehensive model may be complex, expensive and time-consuming to construct.

Despite the problems with the validation of causality, from the point of view of organisational sense-making, causal maps may have significant potential as a communication and rhetorical device. The graphical representation of strategy, using causal links may facilitate a greater understanding of it and thus capture and focus managerial attention on key issues. The importance of causal maps in this case would stem from providing a reference point, creating shared values and beliefs, providing inspiration for managers and acting as a platform for the discussion of strategic uncertainties and cause-and-effect assumptions. In this case, ideally, causal chains should reproduce the prevailing beliefs and individual mental models of managers in organisations. The models are therefore acting as “ammunition machines”, advocating

some vested interests or “rationalisation machines”, creating a semblance organisational order.

The accuracy of any cause-and-effect relations is therefore less critical. We would contend however that, as a consequence, how a given causal PMM is developed and implemented is very important. If the approach is implemented interactively, and cause-and-effect linkages underlying strategy are open for discussion and questioning, the BSC framework may potentially engage companies in strategic learning. However, if the causal links are perceived as self-evident, imposed by senior management in a top-down fashion without further inquiries, they may act as strategic “blindness” and result in a misalignment of the organisation to its strategy. This does raise important questions which can focus future research. How, in practice, are individual maps assembled into the collective causal map? To what extent do strategic causal maps influence individual mental models of managers? What are the prerequisites for a collective causal map to be a guide and inspire coordinated action? What is the role of consultants and senior managers in the process of co-production of the causal maps?

Comparing the different literature streams, it is also important to observe that uncertainty has two, rather opposite effects on the properties of causal links in PMMs which have important implications. On the one hand, uncertainty weakens the reliability of causal links. Companies, which wish to use their models for performance evaluation and setting of targets, have to be aware of the challenges posed by the dynamic and changing organisational environment. In this case, we recommend formal testing and careful analysis of causal links with all its complex issues, such as estimation of time lags and circular relationships. Otherwise they are ‘blindness’ to the complexity of the environment.

However, causal links may have most useful and persuasive properties when dealing with uncertainty. Since causal arrows, displaying visually the value creation chain, facilitates the understanding of strategy by managers and shapes its potential as a powerful communication tool, thus being ‘binders’ for collective development and pursuit of strategy. In this case, we recommend the promoters of causal models within companies should place emphasis on the concise format and visual appeal of their models, which have to be also coupled with efficient communication strategies in order

to ensure the support of managers. Future research is also encouraged in order to understand whether it is possible to combine effectively the analytical capability of causal PMMs and their potential as a communication medium, or if not, in which direction causal performance measurement modelling will eventually evolve.

## References

- Bains & Company (2011), <http://www.bain.com/publications/articles/management-tools-2011-balanced-scorecard.aspx>
- Banker, R., Chang, H. and Pizzini, M. (2011), “The judgmental effects of strategy maps in Balanced Scorecard performance evaluations”, *International Journal of Accounting Information Systems*, Vol.12, No4, pp. 259-279.
- Bourguignon, A. , Malleret V. and Nørreklit H. (2004), “The American balanced scorecard versus the French tableau de bord: the ideological dimension”, *Management Accounting Research*, Vol. 15, No2, pp. 107-134.
- Burchell, S., Clubb, C., Hopwood, A.G., Hughes, J. and Nhapiet, J. (1980), “The role of Accounting in Organisations and Society”, *Accounting, Organisations and Society*, Vol. 5, No1, pp. 5-27.
- Busco, C. and Quattrone, P. (2009), “How management practices diffuse: the Balanced Scorecard as a rhetorical machine”, Working paper presented at the European Accounting Association Conference, Tampere, Finland.
- Cohen, S., Thiraios, D. and Kandilorou, M. (2008), “Performance parameters interrelations from a balanced scorecard perspective”, *Managerial Auditing Journal*, Vol 23 No5, pp 485-503.
- Cooper, D., Ezzamel. M. and Qu, S. (2012), “Popularising the Management Accounting Idea: The Case of the Balanced Scorecard”, *Paper presented at the Management Accounting Section of the American Accounting Association*, Houston, Texas.
- Crosby, L. and Sheery, L. (2006), “Cause and effect”, *Marketing Management*, May-June, pp. 12-13.
- De Geusier, F., Mooraj, S. and Oyon, D. (2009), “Does the Balanced Scorecard Add Value? Empirical Evidence on its effects on performance”, *European Accounting Review*, Vol. 18, No 1, pp. 93-122.
- Eccles, R. (1991), “The performance measurement manifesto”, *Harvard Business Review*, January-February, pp. 131-137.
- Epstein, M. and Westbrook R. (2001), “Linking Actions to Profits in Strategic Decision Making”, *Sloan Management Review*, Vol. 42, No. 3, pp. 39–49.

- Hall, R., (1984), "The natural logic of management policy making: its implications for the survival of organisations", *Management Science*, Vol. 30, pp. 905-927.
- Hall, R. (2002), "Gaining understanding in a complex cause-effect policy domain", in *Mapping Strategic Knowledge*, Huff, A. and Jenkins, M., Eds. pp. 89-111, Sage Publications, London.
- Huff, A.S. (1990), "Maps focused on Causal Reasoning" in *Mapping Strategic Thought*, Huff, A.S. Ed, pp. 28-31, John Wiley & Sons Ltd.
- Huff, A. and Jenkins, M. (2002), *Mapping Strategic Knowledge*, Sage Publications, London.
- Ittner, C.D., Larcker, D.F. and Randall, T. (2003), "Performance implications of strategic performance measurement in financial services firms", *Accounting, Organisations and Society*, Vol.28, pp. 715-741.
- Ittner, C.D. and D.F. Larcker. (2003), "Coming up short on nonfinancial performance measurement", *Harvard Business Review*. Vol. 81, pp 88-95.
- Ittner, C.D. and Larcker, D. F. (2008), "Does measuring intangibles for management purposes improve performance? A review of evidence". *Accounting and Business Research*, Vol. 38, No3, pp. 261-272.
- Kaplan, R.S. and Norton, D.P. (1992), "The Balanced Scorecard: Measures that Drive Performance", *Harvard Business Review*, 70, pp.71-79.
- Kaplan, R.S. and Norton D.P. (1996a), "Using the Balanced Scorecard as a Strategic Management System", *Harvard Business Review* 74, pp.75-85.
- Kaplan, R.S. and Norton. D.P. (1996b), "Linking the Balanced Scorecard to Strategy", *California Management Review*, Vol. 4 (Fall), pp. 53-79.
- Kaplan, R.S. and Norton D.P. (2001a), "Transforming the Balanced Scorecard from Performance Measurement to Strategic Management", *Accounting Horizons* (March), pp.87-104.
- Kaplan, R.S. and Norton D.P. (2001b), *The Strategy-Focused Organisation*, Harvard Business School Press, Boston Mass.
- Kaplan, R.S. and Norton D.P. (2004), *Strategy maps converting intangible assets into tangible outcomes*, Harvard Business School Press, Boston Mass.
- Kaplan, R.S. (2009), "Conceptual foundations of the Balanced Scorecard" in *Handbook of Management Accounting Research*, Chapman, C., Hopwood, A. and Shields, M. Eds.
- Kasurinen, T. (2002), "Conceptualising the encoding process related to institutionalisation in organisations – From key performance indicator scorecard to a strategic balanced scorecard", Working Papers, Vol. 33, Helsinki School of Economics and Business Administration.

- Laitinen, E. (2004), "Towards a microeconomic approach of the balanced scorecard", *Managerial Finance*, Vol. 30, No 6, pp.1-27.
- Luft, J. (2004), Discussion of "Managers' commitment to the goals contained in a strategic performance measurement system", *Contemporary Accounting Research*, Vol.21, No4, pp. 959-964.
- Magretta, J. (2002), "Why business models matter", *Harvard Business Review*, Vol. 80, No5, pp. 86-92.
- Malina, M. , Norreklit, H. and Selto, F. (2007), "Relations among Measures, Climate of Control and Performance Measurement Models", *Contemporary Accounting Research*, Vol. 24, No3, pp. 935-982.
- Malmi, T. (2001), "Balanced Scorecard in Finish Companies", *Management Accounting Research*, Vol 12, pp.207-220.
- Makridakis, S. (1990), *Forecasting, Planning and Strategy for the 21<sup>st</sup> Century*, The Free Press, New York.
- Mintzberg, H. Ahlstrand, B., Lampel, J. (2005), *Strategy Safari*, FT Prentice Hall, Harlow.
- Morgan, G. (1997), "Loops not lines: the logic of mutual causality", in *Images of Organisation*, Morgan, G. Ed. pp. 274-283, Sage Publications, London.
- Norreklit, H. (2000), "The Balance on the Balanced Scorecard: A Critical Analysis of some of it Assumptions", *Management Accounting Research*, Vol.11, pp. 65-88.
- Norreklit, H. (2003), "The Balanced Scorecard: what is the score? A rhetorical analysis of the Balanced Scorecard", *Accounting, Organisations and Society*. No 28, pp. 591-619.
- Norreklit, H. and Mitchell, F. (2007), "The Balanced Scorecard" in *Issues in Management Accounting*, Hopper T., Scapens R.W., Northcott, D., Eds. pp. 175-196, FT Prentice Hall
- Otley, D. (1999), "Performance management: a framework for management control systems research", *Management Accounting Research*, Vol.10, pp. 363-382.
- Pearl, J. (2000) *Causality models, reasoning and inference*, Cambridge University Press
- Papalexandris, A., Ioannou, G. and Prastacos, G.P. (2004), "Implementing the Balanced Scorecard in Greece: a Software Firm's Experience", *Long Range Planning*, Vol.37, pp. 351-366.
- Qu, S. and Cooper, D. (2011), "The Role of Inscriptions in Producing a Balanced Scorecard", *Accounting, Organisations and Society*, Vol. 36, pp.344-362.

Rucci, A. J., Kirn, S. P. and Quinn, R.T. (1998), "The employee-customer-profit chain at Sears", *Harvard Business Review*, Vol. 76, pp. 82-97.

Russell, R. (2003), *The International Perspective: Balanced Scorecard Usage in Europe*. Harvard Business School Publishing, Boston Mass.

Senge, P. (1990), *The fifth discipline. The art and practice of the Learning Organisation*, Random House, London.

Simons, R. (1995), *How Managers use innovative control systems to drive strategic renewal*, Harvard Business School Press, Boston Mass.

Thomson, J. (1967), *Organisations in action: Social Science bases of administrative theory*, McGraw Hill Book Company.

Tuomela, T-S. (2005), "The interplay of different levers of control: a case study of introducing new performance measurement systems", *Management Accounting Research*, Vol. 16, pp. 293-320

Vera-Muñoz, S., Schackell, M., Buehner, M. (2007), "Accountants use of causal business models in the presence of benchmark data: a note", *Contemporary Accounting Research*, Vol.24, No3, pp. 1015-1038

Voelpel, S. C., Leibold, M. and Eckhoff, R. A. (2006), "The tyranny of the Balanced Scorecard in the innovation economy", *Journal of Intellectual Capital*, Vol. 7 No1, pp.43 – 60

Webb, R. (2004), "Managers' Commitment to the Goals Contained in a Strategic Performance System", *Contemporary Accounting Research*, Vol.21, No 4, pp. 925-958.

Weick, K.E. (1990), "Cartographic Myths in Organisations", in *Mapping Strategic Thought*, Huff, A. Ed. pp. 1-10, John Wiley & Sons Ltd.

Weick, K.E. (2001), "Sources of order in Underorganised Systems: Themes in Recent Organisational Theory", in *Making Sense of the Organisation*, Weick, K. E. Ed. pp.32-56, Blackwell Publishers Ltd, Oxford.

Weick, K.E. and M.G. Bougon (2001), "Organisations as Cognitive Maps: Charting Ways to Success and Failure", in *Making Sense of the Organisation*, Weick, K. E. Ed. pp. 308-329, Blackwell Publishers Ltd, Oxford.