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# Is performance measurement and management fit for the future?

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### ABSTRACT

Performance measurement and management (PMM) is a management and research paradox. On one hand, it provides management with many critical, useful, and needed functions. Yet, there is evidence that it can adversely affect performance. This paper attempts to resolve this paradox by focusing on the issue of “fit”. That is, in today’s dynamic and turbulent environment, changes in either the business environment or the business strategy can lead to the need for new or revised measures and metrics. Yet, if these measures and metrics are either not revised or incorrectly revised, then we can encounter situations where what the firm wants to achieve (as communicated by its strategy) and what the firm measures and rewards are not synchronised with each other (i.e., there is a lack of “fit”). This situation can adversely affect the ability of the firm to compete. The issue of fit is explored using a three phase Delphi approach. Initially intended to resolve this first paradox, the Delphi study identified another paradox – one in which the researchers found that in a dynamic environment, firms do revise their strategies, yet, often the PMM system is not changed. To resolve this second paradox, the paper proposes a new framework – one that shows that under certain conditions, the observed metrics “lag” is not only explainable but also desirable. The findings suggest a need to recast the accepted relationship between strategy and PMM system and the output included the Performance Alignment Matrix that had utility for managers.

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## 1. Introduction

It has been long recognised that performance measurement and management (PMM) is critical for the effective and efficient management of any business. PMM facilitates effective control and correction by reporting the current level of performance, and comparing it with the desired level of performance (i.e., the standard). More importantly, the PMM system also communicates strategic intent and

importance to the rest of organisation in terms of what has been measured and, as importantly, by what has not been measured (Magretta and Stone, 2002). To some researchers (e.g., Magretta and Stone, 2002), PMM is more important than the mission statement: metrics enable the organisation to convey the strategy to everyone else in terms they can understand, thus making the strategy concrete and meaningful.

The use of performance measurement and management systems is frequently recommended for facilitating strategy implementation and enhancing organisational performance (e.g., Davis and Albright, 2004) – a view that coincides with much of the Balanced Scorecard rhetoric

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(Kaplan and Norton, 1996; Olve et al., 1999) as well as the findings of business based research (Buckingham and Coffman, 1999). To some, PMM is the business equivalent of the body's nervous system (Beer, 1981, 1985; Bititci et al., 1997), connecting the mission of the business to what it is trying to achieve, while sensing the environment and allowing the organisation to adapt along the way.

Yet, PMM is not without its problems. It has been accused of undermining manufacturing competitiveness (Hayes and Abernathy, 1980), encouraging local optimisation (Hall, 1983; Fry and Cox, 1989) and fostering a lack of strategic focus (Skinner, 1974). These issues led to Franco-Santos et al. (2012) asking the question, "can it be shown that PMM positively affects performance?" This paper views these problems with PMM as symptomatic of a larger more critical problem – the lack of "fit" between the environment, strategy, and what is being measured. The construct of *fit* is fundamental to fields such as strategy (Venkatraman, 1997), but *fit* is poorly defined within the PMM field of study.

We posit that fit is crucial as PMM is most effective when it fits with elements such as business strategy, organisational culture and external environment. Without such a fit, what is being measured (and communicated as important) and what is actually important to the firm are not synchronised with each other. We further posit that the importance of fit increases in direct relationship to the level of business turbulence.

There is strong evidence that the business environment has become highly turbulent (Harrington et al., 2011) and that these changes are structural rather than transient in nature. The following are some of these structural changes:

- An increasing focus on areas such as innovation (Pink, 2005).
- A recognition that being good with process management and lean may adversely affect the ability of the firm to compete on innovation (Benner and Tushman, 2002, 2003).
- A recognition that lean systems may adversely harm the ability of the firm to be responsive (Business week, April 25, 2010).
- The emergence of new business models for delivering value to the customer (e.g., Service Oriented Manufacturing, Lusch et al., 2007).
- Recognition of the importance of blended outcomes, when positions, such as cost leadership, are no longer defensible longer terms strategies (Lee, 2004; Melnyk et al., 2010).
- Proactive governmental legislative interventions and initiations (e.g., Sarbanes-Oxley, Customs-Trade Partnership Against Terrorism or C-TPAT).
- The increasing importance of the supply chain (Reuters, January 10, 2008).

These changes should be reflected in the strategies developed and deployed by firms; in turn, these strategic changes should impact the PMM system (Bourne et al., 2000; Kennerley and Neely, 2002).

Maintaining this alignment between PMM and strategy is not simple. It takes time to restate the strategic

changes into reformulated measures and metrics. It also takes time for these changes to be communicated effectively through the organisation. Finally, it takes time for the participants to accept these changes and for them to change their behaviour. The consequences of misalignment between the PMM system and business environment are both well known and significant (Johnson and Kaplan, 1987).

To assess the proposition that there is a lack of "fit" between the environment, strategic intent and performance measurement, we use a three-phase Delphi method to identify emerging trends in the business environment and to explore how these trends will affect the future of PMM. The Delphi technique was selected because it is most appropriate when the research problem does not lend itself to precise analytical techniques but can benefit from subjective judgments on a collective basis and when time, cost, and logistics would make frequent meetings of all the subjects unfeasible (Linstone and Turoff, 1975). The Delphi technique was used to address the following three key questions:

1. What are the major developments in the business environment facing firms both today and five years into the future?
2. To what extent are PMM systems capable of coping with these changes and developments?
3. How can the resulting insights be synthesised into a useful theoretical framework that has utility for practicing managers and researchers alike?

The Delphi process revealed that, although practitioners related positively to our list of business trends, they were more concerned with the broad sweep of changes they faced rather than any individual elements. They also believed that the current PMM literature and tools available were inadequate for these challenges emphasising the need for a co-evolutionary approach between organisational setting, business strategy and the PMM system. Yet, more importantly, the Delphi study revealed an unanticipated paradox: while managers recognised that they were operating in a more dynamic environment and that a response to these changes had to be incorporated into the resulting strategies, the metrics often were not changed. Our response to this finding was to construct a framework that addressed these concerns. This was tested on and refined by the Delphi expert panel, before being validated further with different practitioner groups.

The rest of this paper is structured as follows. In the next section we present a theoretical perspective of PMM to make the subject clear (as recommended by Franco-Santos et al., 2012). Then, we present the key trends used to inform our study. This is followed by a brief review of the PMM literature before we present our methodology. Our findings are then presented along with a detailed discussion of the paradox. In the last section, the discussion, we present the framework used to resolve the paradox – "the performance alignment matrix" – and its implications for strategy and PMM including suggestions for future research.

## 2. A theoretical perspective of PMM

While widely used, the key terms (e.g., performance measure, metric, metric sets, PMM systems) used in PMM are often not well defined (Neely et al., 1995; Franco-Santos et al., 2007). Consequently, we begin by providing operational definitions of these key constructs.

### 2.1. Performance measure

To quote Neely et al. (1995) “a performance measure can be defined as a metric used to quantify the efficiency and/or effectiveness of action” Here we differ slightly as we differentiate between a performance measure and a metric. So our definition becomes “a performance measure is the instrument used to quantify the efficiency and/or effectiveness of action.” Therefore, a performance measure is both quantifiable and verifiable.

### 2.2. Metric

A metric is more than a performance measure. In the language used in this study, a metric has three distinct elements:

1. A performance measure that quantifies what is happening.
2. A performance standard, or target, that indicates what is considered good and bad performance so guides the direction of the organisation.
3. Consequences relating to being on, below or above target.

While a measure is informative, a metric is critical from a business perspective. All three elements are necessary; removing any one of these elements effectively cripples the metrics and diminishes its effectiveness from a business perspective. For us, metrics are the fundamental building blocks of a PMM system.

### 2.3. Metric sets

These are simply the set of metrics used to guide and influence the actions of people, groups, teams, functions or event organisations. Metric sets tend to be limited in number, cover multiple dimensions (such as the six elements of the Results/Determinants Matrix (Fitzgerald et al., 1991), or the four perspectives of the Balanced Scorecard, (Kaplan and Norton, 1992)) and reflect the strategy or strategic intent of the organisation.

### 2.4. PMM systems

PMM systems consist of two components: the performance measurement system and the performance management system. The performance measurement system encompasses the process (or processes) for setting goals (developing the metric set) and collecting, analysing, and interpreting performance data. The objective of the process is to convert data into information and to assess the effectiveness and efficiency of action (Neely et al., 1995).

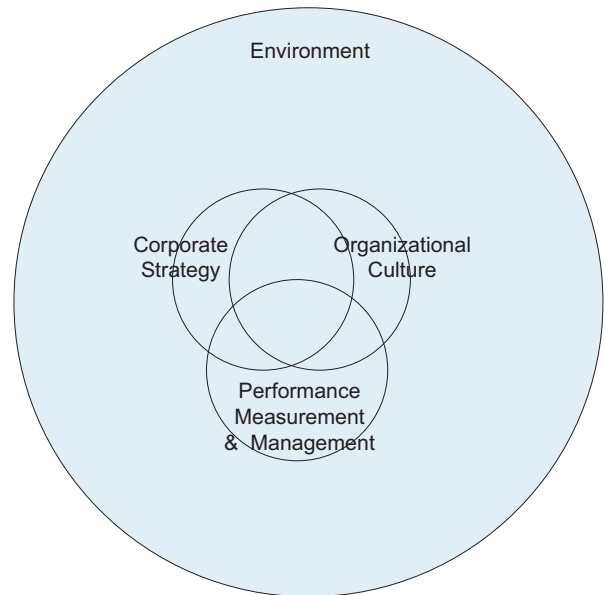


Fig. 1. Theoretical framework of the interfaces with the PMM system.

Although performance measurement is important, it is not sufficient to manage an enterprise. There is a complementary need for a performance management system.

The performance management system encompasses the process (or processes) of assessing the differences between actual and desired outcomes, identifying and flagging those differences that are critical (thereby warranting management intervention), understanding if and why the deficiencies have taken place, and, when necessary, introducing (and monitoring) corrective actions aimed at closing the significant performance gaps. In taking such an approach we need to recognise this must encompass both single and double loop learning (Argyris, 1977). The system should be able to be operated as a simple thermostat, but also to allow higher-level functions, such as the questioning of the standards, assumptions and strategies of the organisation.

These two components form one integrated system – a system that does not operate in an organisational, strategic, or environmental vacuum. That is, changes in organisational structure, culture, corporate strategy or the environment (e.g., technology, governmental action, competitive actions, or social changes) should have a direct consequence for the PMM system. However, we recognise that how the PMM reacts to a change in the environment is tempered by the firm’s organisational strategy, structure and culture. By including organisational culture (Schein, 2004), we recognise that PMM is both a technological process and a social one (Pavlov and Bourne, 2010; Bititci et al., 2012). Fig. 1 represents a framework for understanding the relationships between the environment, strategy, culture, and the PMM system.

The roles that a PMM system plays in managing an organisation are critical; they include (Franco Santos et al., 2007; Bourne and Bourne, 2007):

- Establishing position – current levels of performance.
- Communicating direction – what is to be achieved.
- Influencing behaviour – good and bad performance.
- Stimulating action – identifying when to intervene.
- Facilitating learning – both single and double loop.
- Implementation of strategy – ensuring change happens.

We posit that these functions are so important that if not present the organisation would somehow find some way of providing them. Of these six functions, this study explicitly focuses attention on the second – communication of direction. Essentially, what this study explores is whether the changes impacting the firm are being effectively communicated throughout the firm through the PMM system. That is, does the PMM system provide guidance after a significant change in the environment, or do the strategy and the PMM system have to be updated in light of the unexpected environmental change? We know that the development of a complete and effective PMM system is not a trivial task for managers (Butler et al., 1997; Bourne et al., 2000; Ahn, 2001; Papalexandris et al., 2004; Tuomela, 2005; Cruz et al., 2011) and the same is true of keeping it up to date (Kennerley and Neely, 2002, 2003).

### 3. Business trends

There is strong evidence indicating the presence of major structural changes now taking place in the environment and strategy of most businesses. Drawing in Fig. 1, these changes should affect the PMM system, but in different ways in different environments, cultures and with different strategies. But before we can assess the impact of these changes on PMM, we must first identify and discuss these major trends and developments.

Since the time of the Greeks, philosophers have understood the concept of continual change. Heraclitus' statement is as true today as it was over 2000 years ago when it was made:

“You could not step twice into the same river; for other waters are ever flowing on.”

We are starting to see from managerial research (e.g., Gattorna, 2006; Harrington et al., 2011) and strategy research (Mintzberg and Water, 1985) that the focus on static research is being replaced by awareness that organisations seldom achieve steady-state. Rather, they move from one temporary steady-state to another. Consequently, management must become adept at identifying, evaluating, responding to, and learning from change.

Identifying the business trends that should affect the PMM systems is not a trivial task. One can accept the view of management gurus, search the literature or conduct an opinion survey (Bititci et al., 2012). Any approach taken can be criticised, but our aim was to create a list that would resonate with an experienced set of managers.

The initial list of trends was based on an extensive review of the relevant literature combined with the authors' years of combined experience. We tested this list on a pilot group of managers. We then refined the list and

ensured the revised list was linked to appropriate literature. The final list is shown in Table 1.

### 4. PMM – a critical review

Discussion to this point has focused on the positive aspects of PMM – a view many practitioners subscribe to, given the wide use of PMM in industry (Rigby and Bilodeau, 2009). However, performance measurement is not without its critics.

In the operations literature, traditional accounting based performance measurement has been heavily criticised for undermining manufacturing competitiveness (Hayes and Abernathy, 1980) through encouraging short-termism (Banks and Wheelwright, 1979; Hayes and Garvin, 1982), lacking strategic focus (Skinner, 1974), encouraging local optimisation (Hall, 1983; Fry and Cox, 1989) and encouraging minimisation of variance rather than continuous improvement (Lynch and Cross, 1991). In the accounting literature, criticisms have focused on the inadequacy of information for decision-making (Kaplan, 1984, 1986), being too internally focused (Kaplan and Norton, 1992) and being irrelevant for planning and control purposes (Johnson and Kaplan, 1987; Johnson, 1992). These shortcomings were also raised in the general management literature (Turney and Anderson, 1989; Miller and Vollmann, 1985).

One response to these criticisms was the creation of multi-dimensional performance measurement frameworks such as the S.M.A.R.T. Pyramid (Lynch and Cross, 1991), the Results/Determinants Matrix (Fitzgerald et al., 1991) and the Balanced Scorecard (Kaplan and Norton, 1992), but these too had their limitations (Atkinson et al., 1997; Otley, 1999; Nørreklit, 2000).

More recently the PMM conversation has polarised into two sets of arguments. The first is the argument between the management scientists and others over the usefulness of targets for improving performance (Locke and Latham, 2009; Ordonez et al., 2009). The second is more fundamental to this paper, “can it be shown that PMM makes a positive difference to performance?” (Franco-Santos et al., 2012).

A number of studies have found that PMM positively affects perceived financial and non-financial performance (e.g., Chenhall and Langfield-Smith, 1998; Hoque and James, 2000; Evans, 2004; Hoque, 2004; Van der Stede et al., 2006; De Geuser et al., 2009). However, the result is less clear regarding the effect of PMM on externally reported results. For example, Ittner and Larcker (1998) found that the use of multi-criteria performance measures positively affect future accounting financial performance, but later they (Ittner et al., 2003) showed that the use of multi-criteria performance measures had no association with accounting financial performance. Crabtree and DeBusk (2008) found companies using performance measurement combined with linked cause and effect relationships (Strategy or Success Maps) had better stock market and accounting performance in the first three years of adoption. Yet Braam and Nijssen (2004) noted that unless the balanced scorecard is aligned well with business strategy, the result is a deterioration in financial performance.

**Table 1**  
Key business trends.

Factors	References
Transparency/accountability of activities and decisions Environmental sustainability of operations and activities	Goleman (2009), Rayner (2003) Waddock and Graves (1997), Pohle and Hittner (2008), Hull and Rothenberg (2008), Bititci et al. (2012)
Cost reduction and management	Hayes and Garvin (1982), Hayes and Wheelwright (1984), Treacy and Wiersema (1993)
Centralization of decision-making Decentralisation of decision-making New models and approaches to innovation	Ulhøi (2004), Adams et al. (2006), Hull and Rothenberg (2008), Chesbrough and Garman (2009), Bititci et al. (2012)
New business models and approaches to competition	Burke et al. (2010), Vandermerwe and Rada (1998), Lusch et al. (2007), Bititci et al. (2012)
Value-driven competition (shifting the focus from cost to other dimensions that are more attractive to our critical customers) New markets/customers/customer behaviour Information technology enabled structures (e.g., enhanced connectivity of people and organisations, virtual enterprises, virtual supply chains, service oriented manufacturing) Supply chain networks	Treacy and Wiersema (1993), Slater and Narver (2000), Piercy and Cravens (2000) Ansoff (1984), Woodruff (1997), Bititci et al. (2012) Chesbrough and Garman (2009), Bititci et al. (2012)
Intangible assets (e.g., knowledge, intellectual property, reputation, social capital). Responsiveness to both predictable and unpredictable events. Security (within the firm, within the supply chain). Risk awareness and risk management	Gunasekaran et al. (2001, 2004), Angerhofer and Anglides (2006), Lehtinen and Ahola (2010), Bititci et al. (2012) Gronroos (1997), Kaplan and Norton (2001), Marr and Adams (2004), Bititci et al. (2012) Nutt (1984), Bititci et al. (2012) Melnyk et al. (2010) Calandro et al. (2008), Ritchie and Brindley (2007)

Recently, the Franco-Santos et al. (2012) literature review concluded that PMM had a positive aspect on many elements of behaviour, organisational routines and practices, but that PMM had a cost overhead that dissipated some of these benefits. The paper also noted that the way the measurement system was designed, developed and used, together with how well the PMMs fit the context in which it operated, was critical to the effect PMM has on behaviour, organisational capabilities and performance (Franco-Santos et al., 2012, page 99). These findings support this paper's view of the importance of fit between PMM and context.

## 5. The Delphi study

The Delphi technique is a method used to obtain a reliable consensus of opinion of a group of experts by means of a series of questionnaires combined with controlled feedback (McKenna, 1994). As a technique, it is designed to handle opinions rather than objective facts (Schmidt, 1997), so a Delphi study is an appropriate research design for structuring a group communication process for allowing individuals to deal with complex problems (Akkermans et al., 2003; Delbecq et al., 1975). It is appropriate for exploratory theory building (Akkermans et al., 2003; Meredith Jack et al., 1989) on interdisciplinary issues involving a number of new or future trends (Akkermans et al., 1999; Klassen and Whybark, 1994), such as our interest in the future of performance measurement and management. It is a widely used technique, having been used in over 1000 published research studies since its introduction during the late 1940s (McKenna, 1994).

The Delphi technique is appropriate when the research problem does not lend itself to precise analytical techniques but can benefit from subjective judgments on a collective basis and when time, cost, and logistics would

make frequent meetings of all the subjects unfeasible (Linstone and Turoff, 1975). Further characteristics of the Delphi technique can be found in Chochoilik et al. (1999), Loughlin and Moore (1979) and Whitman (1990). It is important to note that this technique, while widely used in other fields, has seen almost no usage in research focusing on PMM.

### 5.1. The application of the Delphi technique

In this study we applied the Delphi technique in three phases: (1) a questionnaire; (2) the Delphi meeting; and, (3) the framework testing.

#### 5.1.1. Phase 1 the Delphi questionnaire

The starting point for this phase was the development of the questionnaire. Drawing on the literature discussed above, we identified our view of PMM and the trends we saw influencing PMM. The initial questionnaire was pre-tested and revised (the final topics selected for the Delphi survey are listed in Table 1). Once revised, the survey instrument was hosted on an internet web site controlled by the research team for selected online participants to access.

The success of the Delphi technique is dependent on the selection of the panel of experts. The panel selected consisted of both academic PMM experts and representatives from industry who are expert practitioners in the field. The following resources were used to identify these "experts":

- The literature review.
- Academics/researchers from the Performance Measurement Association.
- Representatives from PMM roundtables, relevant professional bodies and discussion forums; and, Consultants involved with PMM design, implementation and use.

The participants not only had to be recognised and validated as domain experts, they also had to be willing to participate in the second part of the study—the on-site workshop. The participants were given three weeks in which to respond (the resulting findings are presented later on). This phase ended with the results being fed back to the participants.

### 5.1.2. Phase 2 the Delphi workshop

Phase two consisted of a one day workshop with the panel of experts. During the workshop, the survey findings were discussed and the issues uncovered further developed in subsequent breakout groups. Although the details of the survey were discussed, the groups focused on the bigger picture portrayed by the survey rather than the individual elements. The intent of this workshop was to review the findings, discuss the unusual findings and identify the issues that should be considered in future studies.

### 5.1.3. Phase 3 the framework testing

During the last phase, the research team focused on the major findings and issues raised during the workshop. The intent of this phase was to translate these findings into a framework that could be used to better understand the linkages between the environment, strategy, and the PMM under conditions of turbulent change. The resulting framework was subsequently validated by circulating it to the panel of experts for comment. It was then further refined by using individual one to one conversations and three smaller practitioner working groups. Finally, the framework was reviewed in two open forums of directors and senior managers and we gathered their feedback and specific examples. In addition to the original panel of experts, some 60 people were involved in the different elements of phase three.

## 5.2. Findings

### 5.2.1. Phase 1 – the Delphi survey

The panel of experts participating in this study consisted of 30 respondents, with some 80% coming from the private sector (with an equal split between manufacturing and service), and the balance from academia. The respondents primarily came from large and very large companies operating nationally and internationally. The individuals themselves held senior positions, with 60% describing themselves as senior managers, company directors and vice presidents and 10% as chief executives. 90% of respondents claimed over 5 years experience of performance measurement and management issues with nearly half of all respondents having over 15 years.

The results of the survey are summarised in [Table 2](#) (importance today), [Table 3](#) (importance five years from today), and [Table 4](#) (impact of the trends on the performance measurement and management systems). An analysis of the resulting data revealed several important findings.

First, except for one factor (new markets/customers/customer behaviour), all of the factors were viewed as having increased importance in the future.

This finding points to the emergence of a more complex and demanding environment.

Those working in the field of risk management and needing to be responsive to predictable and unpredictable events will understand the current high levels of concern for these factors and be aware of their increasing future importance. There are few studies and frameworks that successfully deal with the integration of risk and performance management (with [Calandro et al. \(2008\)](#) being one of the rare exceptions), although from our anecdotal knowledge of practice and from discussions in the Delphi workshop leading companies are trying to make progress in the area.

Innovation, new business models and value driven competition are all considered to be of high importance both now and in the future and their impact on the PMM system is considered significant. This result should be considered along with the relatively low impact on the PMM system of intangible assets. This suggests that the issue is measuring the outputs and outcomes of such developments rather than the drivers. The Delphi workshop provided a different perspective on this which we present and discuss later.

The environmental impact of operations is increasing in importance – an observation emphasised by the fact that this factor experienced the largest positive change in importance over the next five years. Yet, its impact on the PMM systems is considered to be only of some importance. Given the current economic climate, it is also probably not surprising that cost reduction and management is rated highly. Cost reduction and management is not expected to become a factor that will increase in importance, but it is one of the factors with the greatest impact on the PMM system.

Finally, there is a cluster of issues around decision-making. Transparency of decision-making is considered to be the most important issue in the future and the factor that will have the greatest impact on the PMM system. This is combined with a shift from centralisation to decentralisation of decision-making.

### 5.2.2. Phase 2 – the output of the Delphi workshop

Following the completion of the survey and the feedback of the results to the participants, a Delphi workshop was organised. The majority of the experts attended the session in Cambridge, UK. During the one-day workshop, the Delphi survey results were discussed and debated along with their implications for PMM. The panel was split into two groups, each considered the implications for how they managed in practice. The groups had different discussions, but the consensus was that the changing environment would have a consequence for PMM.

In their discussions, the first group identified issues around difficulties in measurement and alignment. The consensus was that outcomes were often most easily stated, whereas creating the appropriate supporting measures of how the outcomes were to be achieved and how the necessary capabilities were to be developed was more difficult. It was perceived that there were significant obstacles to achieving alignment between these measures. Amongst the obstacles cited, emerging processes, complex situations and managing opportunities best illustrated the flux

**Table 2**  
Importance to the organisation today.

#	Importance to the organisation today of ...	No/very low importance	Low importance	Some importance	High importance	Significant importance – essential	Responses	Mean
1	Transparency/accountability of activities and decisions.	1	1	7	16	5	30	3.8
2	Environmental sustainability of operations and activities.	0	3	9	15	2	29	3.5
3	Cost reduction and management.	0	1	10	11	8	30	3.9
4	Centralization of decision-making.	2	9	13	4	0	28	2.7
5	Decentralisation of decision-making.	0	0	15	11	2	28	3.5
6	New models and approaches to innovation.	0	3	7	12	8	30	3.8
7	New business models and approaches to competition.	0	4	8	7	10	29	3.8
8	Value-driven competition (shifting the focus from cost to other dimensions that are more attractive to our critical customers).	0	2	7	12	8	29	3.9
9	New markets/customers/customer behaviour.	0	0	5	12	11	28	4.2
10	Information technology enabled structures (e.g., enhanced connectivity of people and organisations, virtual enterprises, virtual supply chains, service oriented manufacturing).	0	4	9	11	5	29	3.6
11	Supply chain networks.	1	6	7	12	2	28	3.3
12	Intangible assets (e.g., knowledge, intellectual property, reputation, social capital).	2	1	8	9	9	29	3.8
13	Responsiveness to both predictable and unpredictable events.	0	1	7	12	9	29	4.0
14	Security (within the firm or within the supply chain).	0	1	13	12	3	29	3.6
15	Risk awareness and risk management.	0	1	8	16	4	29	3.8
16	Other.	1	0	3	2	2	8	3.5

many faced when the environment changed. This created challenges, particularly because of the time and number of iterations needed to get the metrics aligned with the new strategy and the confusion caused during the change.

The second group raised the issue of the limitations of metrics in managing the organisation. They highlighted the challenges in forecasting in a turbulent environment together with the need for metrics to be dynamic and move synchronously with the changing environment and business. Obstacles cited revolved around creating a holistic view whilst recognising that making the correct decisions early with incomplete data could give a firm a competitive advantage over those delaying their decision making until they had concrete evidence from their measurement system for a need to change. The resulting key challenges were associated with enabling local creativity within strategic direction, enabling local teams to sense make and interpret the strategy and translate their understanding into executable plans.

The Delphi participants were all experienced managers and directors from leading companies, but the picture they painted was of flux, change and uncertainty. They saw environmental change as a way of life with strategic intent being only the start of the process. The firm needs to respond as a whole with different managers in different parts of the business being guided to respond appropriately whilst locally working through and implementing

their own element of the emerging strategy. This was summarised as follows:

“The belief is that the business environment in which we are trying to run our businesses is changing. The speed of change in technology and increasing levels of connectivity are combining with shifts in economic patterns of activity to make markets extremely unpredictable and more complex to manage. For businesses to survive, they need to quickly identify new threats and opportunities, make decisions about their responses and implement these decisions quickly. This environment favours organisations that are smaller and are managed by their owners.

The issue for larger corporations is how to guide managers in their decision-making. The corporation wants decisions to be taken in the best interests of the longer-term future of the company taking into account the potential gains and risks involved. This will involve the balancing of short-term performance against the building of capability for the future as well as the risk and benefits of doing that. In the past, managers have been assessed based on their performance against measures and targets, but we are no longer certain that we can adequately define the measures and targets, especially in a volatile environment, to assess managers without constraining the speed of decision making and action that we now need to be successful. Finally, there is an

**Table 3**

Importance to the organisation 5 years in the future.

#	Importance to the organisation 5 years in the future of . . .	No/very low importance	Low importance	Some importance	High importance	Significant importance – essential	Responses	Mean
1	Transparency/accountability of activities and decisions.	0	0	2	11	17	30	4.5
2	Environmental sustainability of operations and activities.	0	0	3	11	15	29	4.4
3	Cost reduction and management.	0	3	4	15	8	30	3.9
4	Centralization of decision-making.	5	6	9	7	2	29	2.8
5	Decentralisation of decision-making.	0	2	12	11	4	29	3.6
6	New models and approaches to innovation.	0	0	7	13	10	30	4.1
7	New business models and approaches to competition.	0	1	5	11	12	29	4.2
8	Value-driven competition (shifting the focus from cost to other dimensions that are more attractive to our critical customers).	0	2	1	11	15	29	4.3
9	New markets/customers/customer behaviour.	1	0	4	11	12	28	4.2
10	Information technology enabled structures (e.g., enhanced connectivity of people and organisations, virtual enterprises, virtual supply chains, service oriented manufacturing).	2	2	4	11	11	30	3.0
11	Supply chain networks.	1	4	6	13	5	29	3.6
12	Intangible assets (e.g., knowledge, intellectual property, reputation, social capital).	1	0	7	10	12	30	4.1
13	Responsiveness to both predictable and unpredictable events.	0	0	5	13	12	30	4.2
14	Security (within the firm or within the supply chain).	0	1	12	12	5	30	3.7
15	Risk awareness and risk management.	0	0	5	14	11	30	4.2
16	Other.	2	0	3	0	6	11	3.7

increasing need to enable local decision making within the broader framework of the rest of the organisation. This requires measurement to be used more as an information and learning tool than as a control mechanism.”

In coming to this conclusion, the expert panel focused on the broad environmental trends and business issues raised by the survey. They had real concerns about how to deal with an increasingly unpredictable fast moving business environment. From a practice perspective, the panel felt that the current PMM literature contained little guidance that addressed these concerns and there was a dearth of prescription or guidance. First, guidance was static in nature whereas the managers had to deal with a dynamic, uncertain environment. Second, the guidance offered was overly simplistic and highly mechanistic and very prescriptive—when the environment changes, the strategy **must** change; when strategy changes, the PMM **must** change. The managers felt that more of a conditional, contingent response was required – one that recognised that the strategic and PMM response was highly dependent on numerous factors and issues. Such a contingent response was lacking in the PMM literature.

### 5.2.3. Phase 3 – developing the framework

One of the objectives of the third phase was to interpret the findings generated in the second phase and to make sense of any unusual findings. One of the most

critical unusual findings involved the linkage between the environment, strategy and PMM. It was noted that, under some conditions, the metrics changed, while under other conditions, they did not (even under conditions where the strategy itself was altered). Given that the participants were drawn from the same level of management and they came from well-managed organisations, these findings presented the researchers with a paradox—why would organisations under certain conditions choose to not link strategy to PMM? The result was a research paradox.

As noted by [Poole and Van de Ven \(1989\)](#), interesting research often stems from dealing with paradoxes. When dealing with paradoxes, we can draw on one of four options: (1) ignore the paradox and live with the situation; (2) assume that the paradox is due to organisational spatial differences (i.e., how people on the shop floor see issues as compared with top management); (3) view the paradox as reflecting temporal separation (the distinctions reflect changes in firms that are at different stages of development or maturity); or, (4) revise the theory. In addressing this paradox, the research team was forced to rethink the strategy-metrics linkage. Essentially, what we did was to resolve the paradox – to rethink the linkages by revising the underlying theory. This was necessitated because the first three options were not appropriate. A new theory was needed and that resulted in the Performance Alignment Matrix.



**Table 4**  
Impact of the trends on performance measurement and management systems.

#	Question	No impact	Low impact	Some impact	Moderate impact	Significant Impact	Responses	Mean
1	Transparency/accountability of activities and decisions.	2	1	5	3	18	30	4.2
2	Environmental sustainability of operations and activities.	2	4	8	6	9	30	3.6
3	Cost reduction and management.	1	4	5	8	11	30	3.9
4	Centralization of decision-making.	3	5	9	8	3	29	3.2
5	Decentralisation of decision-making.	1	2	8	8	9	29	3.8
6	New models and approaches to innovation.	1	3	7	6	12	30	3.9
7	New business models and approaches to competition.	1	4	3	13	8	30	3.8
8	Value-driven competition (shifting the focus from cost to other dimensions that are more attractive to our critical customers).	2	3	2	10	11	29	3.9
9	New markets/customers/customer behaviour.	1	5	4	9	10	30	3.8
10	Information technology enabled structures (e.g., enhanced connectivity of people and organisations, virtual enterprises, virtual supply chains, service oriented manufacturing).	2	4	5	5	13	30	3.8
11	Supply chain networks.	3	5	8	6	6	29	3.3
12	Intangible assets (e.g., knowledge, intellectual property, reputation, social capital).	2	2	8	11	6	30	3.6
13	Responsiveness to both predictable and unpredictable events.	1	3	8	5	12	30	3.9
14	Security (within the firm or within the supply chain).	2	7	10	8	2	30	3.1
15	Risk awareness and risk management.	1	4	5	7	12	30	3.9
16	Other.	3	1	2	0	4	10	3.10

### 5.3. The Performance Alignment Matrix

Specifically, the framework is intended to explain the relationship between strategy and the PMM system. Through discussion and debate at the following small working groups, the matrix was refined to reflect more fully the complexity faced by many larger organisations that have multiple levels of decision-making and diverse operating contexts. The result of these discussions was the conclusion that the matrix was subsequently determined to be a useful tool for guiding the use of measurement in different parts of the organisation over different levels and at different stages of strategy development and execution.

The Performance Alignment Matrix (Fig. 2) is a simple  $2 \times 2$  matrix consisting of two dimensions: *outcomes* and *solutions*. The first dimension is that of *outcome* or the results that are required. An *outcome* is a conceptualisation of an organisation's vision or goal. Outcomes can be positioned on a scale ranging from General (where there

is a broad understanding of what is required) to Specific (where the decision-maker has a fairly good idea of what is desired). For the matrix we have segmented the scale into two ordinal points that we have called General Outcomes and Specific Outcomes. The points on the scale are best illustrated by the following example:

- General Outcomes
  - I want to do radical innovation.
  - I want my supplies secured.
- Specific Outcomes
  - I need five new products launched by the end of the year.
  - I need armed security to protect my supplies.

Another way of thinking about outcomes is to think in terms of certainty. The more certain that management is of the changes in the environment and management's ability to identify an appropriate strategic response, then the more tightly we would expect the outcomes to be specified. Alternatively, when the environment is experiencing high fluctuations and turbulence, management may decide to preserve strategic flexibility by stating its strategic objectives in general terms. This approach identifies the general direction of the response without committing the firm to a specific set of responses. In reviewing the levels of this first factor, we should recognise that where management lands is not simply a result of the uncertainty present in the

		Outcome	
		General	Specific
Solutions	General	Assessment-driven management	Outcome-driven solutions
	Specific	Solution-driven outcomes	Measurement-driven management

**Fig. 2.** The Performance Alignment Matrix.

environment; it is also strongly influenced by management's confidence in the appropriateness of its solution. We would expect the higher the confidence, the higher the specificity; the lower the confidence, the lower the specificity.

The second dimension focuses on the *solutions* adopted by the organisation. Solutions are the specific approaches the organisation adopts to deliver the outcome. Again, solutions can be placed on a scale running from general to specific and we can segment this scale into two categories which we label *general* and *specific*. If the solution is defined in *general* terms (e.g., we want to be operationally excellent), there are multiple ways available to achieve a given outcome, all of which are equally acceptable. When the solutions are general, then management has not identified a specific, preferred method of achieving its outcomes. Alternatively, a solution can be defined in *specific* terms (e.g., we want to introduce a KANBAN by the end of the financial year) where there is only one way of achieving the desired outcome.

Combining these two dimensions generates the following matrix (Fig. 2) and the four quadrants of the matrix are described next.

**Measurement-driven management:** Measurement driven management is the most specific form of measurement. It is measurement in its purest form. This is measurement that is after the fact. This approach makes sense when the method is fixed and the outcome determined. Here the main concern is that of matching actual performance with the target set and identifying whether you achieved the objectives or not. This is most attractive and most appropriate when dealing with a stable environment. It is here that we expect to see a strong, direct, and immediate linkage between strategy and metrics. It is here that we can expect to see changes in strategy drive changes in metrics. This situation is most appropriate when management knows how best to respond to the changes in the environment, when it has high confidence in its strategic solution and it can identify in advance the specific approach to be used to achieve these outcomes.

**Outcome-driven solutions:** With this approach, the outcome is clearly specified, yet the solution is only outlined in general terms. Here the strategy adopted to reach the organisational goal is not critical *as long as* the desired outcome is achieved. That is, we are not interested in how the people achieve the specific goals, as long as the general goals are achieved. Consequently, we specify the outcome and let others in the organisation determine the solution. Because of the desired flexibility in the specific outcomes achieved, we do not build in an immediate linkage between strategic goals (outcomes) and metrics on action plans (solutions). Rather, the linkage is *lagged*. That is, we introduce the specific strategic goals; the organisation is allowed to explore alternative approaches and ultimately select the method that works best. Once the best approach has been identified, we can then "lock" it by specifying the exact metrics to be used.

**Assessment-driven management:** Here, the outcome is broadly described (e.g., we want radical innovation in our industry) and management is open to any solution and outcome as long as it is consistent with the broad

goal. Consequently you cannot measure against a tightly defined goal, you can only assess progress. So in the *assessment driven management* box we are moving away from measurement and towards assessment. To assess the solution you will need to focus on whether the organisation has the necessary capabilities in place (right people, right processes, systems, sufficient slack resources, adequate communication, appropriate level of incentives and opportunities for accidental innovation). To assess the outcome, you will have to assess whether the projects and tasks aimed at satisfying the broad outcomes are being carried out, whether the tasks are on track and whether they are delivering results in line with the broadly defined goals. You do not want to measure outcome or solution specifically because, if you do, then you run the risk of shaping the outcome in ways not desired.

In this quadrant, management is concerned that in setting specific metrics, it will be inadvertently shaping and changing the resulting outcome. To understand this quadrant, consider the following situation.

Management has decided that the firm will compete by focusing on radical innovation. The problem is that radical innovation can take many different forms. The firm is largely indifferent to the form taken; what they want are innovations that are new to the world and that change how things are done. However, if specific metrics are introduced, then management may be influencing the type of innovation being pursued. If we measure cost, then we can expect to see innovations that focus on cost.

There is an important issue to be considered for this quadrant. That is the issue of frequency of strategic revision. When the environment is highly turbulent, management may encounter situations where it frequently changes the strategy. If we were to build a strong linkage between strategy and metrics, we might create a situation best described as *system nervousness*. That is, as strategy frequently changes, we can expect the metrics to change. With frequent changes in metrics, we can create confusion and frustration as the people held accountable for meeting the standards embodied in the metrics are not sure of what metrics they will be held accountable for in the next period.

**Solution-driven outcomes:** This quadrant captures what happens when the measurement drives the outcome. This is the situation where the organisation does not have clear strategic direction or goals. This creates a vacuum, which some managers fill by creating specific solutions. These are often measures of activity with no clear links to outcomes. By specifying quantitatively what is needed, people are directed towards specific solutions. But this creates the situation where managers stop exploring alternative solutions or, because they have some measures, they forget the need for setting higher level goals.

In this quadrant, management may not be sure as to the specific nature of strategic outcomes being pursued, but the methods that will be used can be specified in advance.

In some ways, this is a potentially dangerous quadrant because management may be letting the execution (how things are done and measured) shape and influence the corporate strategy. That is, the strategy over time formalizes what the firm is doing and what it is measuring. Consequently, we could encounter situations where strategy

Description	Outcome	Solution	When	Usefulness	Possible issues
<b><u>Measurement driven management</u></b>	Specific	Specific	You know what you need to achieve and how you will achieve it	You can be very specific in terms of both the activities and results required. Making goals measurable can focus people on attaining those goals. It is very useful in operational type settings with well specified systems and routines	People are focused so they are not looking for other approaches and opportunities. You need to be sure of your strategy as everyone is focused on implementation
<b><u>Outcome-driven solutions</u></b>	Specific	General	You know what is to be achieved but not how it is to be achieved	You use the outcome to direct activity, but you want your people to be creative and inventive in how the outcome is achieved, usually because it cannot be specified in advance.	You can measure success but it is hard to measure progress. You need to create a dialogue so you can assess progress.
<b><u>Assessment driven management</u></b>	General	General	You can only specify in general terms what is to be achieved and how it is to be achieved	You use this in situations where you need to engage your people in creating their own future without too many constraints on how this is to be achieved	You are very reliant on the professionalism and judgment of your staff and on your ability to assess performance. You will need to create open dialogue at all levels of the organization to assess progress and success
<b><u>Solution driven outcomes</u></b>	General	Specific	You are not sure what is to be achieved but you need to start and direct some activity to progress	This can be dangerous as it creates activity without a purpose. However, there are occasions when this can be beneficial when people need structure to perform.	Often used when strategic goals are not clear, or inadequately cascaded down the organization. The focus is activity rather than outcomes. Departments often use this to justify their own existence, or individuals to show how important or busy they are.

Fig. 3. Guidance on alignment.

focuses on what the firm does well and what it measures rather than what the market wants. In other words, structure may determine strategy.

Given the high potential for danger associated with this specific quadrant, we have chosen to highlight this quadrant in light grey to indicate the potential danger present. Fig. 3 summarises our guidance on the Performance Alignment Matrix created from the practitioner reviews.

## 6. Discussion

This paper is based on the premise that for PMM to be effective it has to fit the environment in which it operates. The aim of this paper was to use future business trends as a basis for thinking about current PMM practice and the consequences for these practices in a changing world. What we have found through this study is that practitioners are currently struggling to manage in volatile environments, especially in situations where the solution or approach has not been fully developed. The panel's view was that this situation will be exacerbated based on their understanding of business trends. Hence the panel was looking for help and guidance with their PMM practices for the future.

In our initial conceptualisation we discussed the need for fit between the environment, the strategy and the PMM system. This leads us to three types of fit, specifically:

- The fit between the environment and the strategy.
- The fit between the strategy and the PMM system.
- The fit between the environment and PMM system.

The importance of maintaining the fit between the environment and the business strategy has been addressed by writers such as Beer (1981, 1985) together with authors (Miles and Snow, 1978; Miles et al., 1978) who propose alternative approaches to interacting with the environment in the development of strategy. However, this type of fit was not the specific focus for this paper.

The fit between strategy and the PMM system has often been portrayed as the process of ensuring the PMM system reflects strategy (Kaplan and Norton, 1993; Neely et al., 1995). However, more recently attention has focused on ensuring that the PMM system keeps abreast of the changes in strategy (Bourne et al., 2000; Kennerley and Neely, 2002, 2003). This approach assumes that a change in the environment stimulates a change in strategy and a change in strategy should stimulate a change in the PMM system.

The direct fit between the environment and the PMM system has received far less attention. In fact most of the literature assumes that a change in environment will necessitate a change in the strategy leading to a change in the PMM system. Further, this is often a three step process as it is the PMM system that detects the change in the environment, which leads to the change in strategy and then finally to the change in the PMM system. But what happens if the environment is so turbulent that this two or three step approach takes too long to implement? Can the PMM system remain resilient to a change in the environment and so continue to provide appropriate guidance to managers in real time?

Traditionally PMM systems have tended towards the specific, with firms using metrics (KPIs and targets in our

terminology) that promote specific outcomes and focus on specific solutions. These are more appropriate for driving efficiency in stable environments and such PMM systems are not resilient to environmental change. In contrast to this approach, our framework offers an alternative view of PMM, an approach more appropriate to volatile environments. An organisation can build resilience into its PMM systems by either being very clear what the specific outcome is whilst leaving the solution general, or by leaving both outcome and solution general. Resilience comes from the PMM system continuing to provide direction and guidance to managers in response to quite severe environmental changes without the need to spend time and effort updating the strategy and the PMM system. We believe that such a solution was the main desire of the Delphi panel.

This discussion is leading us to believe that we need to recast the relationship between strategy and PMM. The old adage that the PMM system should reflect strategy (Kaplan and Norton, 1993, 1996) needs to be updated as we have long been aware that PMM informs and challenges strategy (Bourne et al., 2000; Neely et al., 2000). But this work goes further suggesting a far more important role for PMM in directing the business. We are suggesting that the strategy and PMM system need to be co-created to better reflect the business environment and the business strategy being developed. In that process, managers have the choice between creating a more focused but brittle PMM system or creating a less focused but more resilient approach. Further, it should be noted that if strategy signals intent but the PMM influences behaviour, it is important that the PMM system has resilience, so stays relevant even if the strategy becomes (for a time) out of date.

## 7. Conclusions

In this paper we have presented the results from a Delphi study involving a senior and experienced panel looking at the future environmental and business trends together with the consequences for PMM. Our premise was that PMM had to fit the strategy and the environment to be effective. This initial premise also had resonance with the academic PMM literature where Franco-Santos et al.'s (2012) recent literature review of empirical studies concluded that the fit between the organisational setting and PMM is important for performance. However, the literature provides little guidance on the exact nature of this type of fit and on tools that can help managers better manage performance in more volatile settings.

Our Delphi study led us to construct a framework to help managers understand the implications of how they design and use PMM systems, and the framework was found to have utility. However, the main contribution of this paper is the suggestion that the role and position of PMM in the literature is incorrect. This study questions the feasibility of developing PMM from strategy in volatile environments; it questions the utility of strategy under such conditions and suggests that a resilient PMM system would be a better approach. We are not suggesting that PMM should replace strategy but we are suggesting that a more nuanced approach to the co-creation of strategy and PMM would be beneficial for turbulent environments. Unfortunately, on

the subject of the interface between strategy and PMM, the strategy literature is currently silent.

In terms of the wider research agenda, there are three immediate conclusions and recommendations for further research. First, there is a need to better understand the strategy design and deployment process, especially the linking with PMM and how they should be dovetailed together in their formulation to better cater for more turbulent environments. Second, the findings of this study reinforce the literature that PMM needs to be researched in different contexts (Franco-Santos et al., 2012). Third, the matrix developed only partly addresses the need to better understand and manage risk and performance together. This need has been mentioned in this paper but there was a section of the panel that believed the integration of performance and risk management needed significantly more study and development. In conjunction with the two prior suggestions, this provides a rich breeding ground for future research on this topic that is both theoretically timely and highly relevant for practice.

## References

- Adams, R., Bessant, J., Phelps, R., 2006. Innovation measurement management: a review. *International Journal of Management Reviews* 8 (1), 21–47.
- Ahn, H., 2001. Applying the balanced scorecard concept: an experience report. *Long Range Planning* 34 (4), 441–461.
- Akkermans, H.A., Bogerd, P., Vos, C., 1999. Virtuous and vicious cycles on the road towards international supply chain management. *International Journal of Operations & Production Management* 19 (5/6), 565–581.
- Akkermans, H.A., Bogerd, P., Yucesan, E., van Wassenhove, L.N., 2003. The impact of ERP on supply chain management: exploratory findings from a European Delphi study. *European Journal of Operational Research* 146 (2), 284–301.
- Angerhofer, B.J., Anglides, M.C., 2006. A model and a performance measurement system for collaborative supply chains. *Decision Support Systems* 42, 283–301.
- Ansoff, I.H., 1984. *Implanting Strategic Management*. Prentice Hall, Englewood Cliffs, NJ, USA.
- Argyris, C., 1977. Organizational learning and management information systems. *Accounting, Organizations and Society* 2 (2), 113–123.
- Atkinson, A.A., Waterhouse, J.H.M., Wells, R.B., 1997. A stakeholder approach to strategic performance measurement. *Sloan Management Review* 38 (Spring (3)), 25–37.
- Banks, R.L., Wheelwright, S.C., 1979. Operations versus strategy – trading tomorrow for today. *Harvard Business Review* 57 (May/June (3)), 112–120.
- Beer, S., 1981. *Brain of the Firm*. Wiley, Chichester, England.
- Beer, S., 1985. *Diagnosing the System for Organisations*. Wiley, Chichester, England.
- Benner, M.M., Tushman, M.L., 2002. Process management and technological innovation: a longitudinal study of the photography and paint industries. *Administrative Science Quarterly* 47 (4), 676–706.
- Benner, M.J., Tushman, M.L., 2003. Exploitation, exploration, and process management: the productivity dilemma revisited. *Academy of Management Review* 28, 238–256.
- Bititci, U., Garengo, P., Dorfler, V., Nudurupati, S., 2012. Performance measurement: challenges for tomorrow. *International Journal of Management Reviews* 14 (3), 305–327.
- Bititci, U.S., Carrie, A.S., McDevitt, L.G., 1997. Integrated performance measurement systems: a development guide. *International Journal of Operations and Production Management* 17 (May/June (6)), 522–535 (MCB University Press).
- Bourne, M.C.S., Bourne, P.A., 2007. *Instant Manager; Balanced Scorecard*. Hodder & Stoughton, London.
- Bourne, M.C.S., Mills, J.F., Wilcox, M., Neely, A.D., Platts, K.W., 2000. Designing, implementing and updating performance measurement systems. *International Journal of Production and Operations Management* 20 (7), 754–771.

- Braam, G.J.M., Nijssen, E.J., 2004. Performance effects of using the balanced scorecard: a note on the Dutch experience. *Long Range Planning* 37 (4), 335–349.
- Buckingham, M., Coffman, C., 1999. *First Break all the Rules: What the World's Greatest Managers do Differently*. Simon & Schuster, London.
- Burke, A., van Stel, A., Thunk, R., 2010. Blue ocean verses five forces. *Harvard Business Review* 88 (May (5)), 28.
- Butler, A., Letza, S.R., Neale, B., 1997. Linking the balanced scorecard to strategy. *Long Range Planning* 30 (2), 242–253.
- Calandro Jr., J., Lane, S., Dasari, R., 2008. A practical approach for risk taking performance. *Measuring Business Excellence* 12 (4), 4–12.
- Chenhall, R.H., Langfield-Smith, K., 1998. The relationship between strategic priorities, management techniques and management accounting: an empirical investigation using a systems approach. *Accounting, Organizations and Society* 23 (April (3)), 243–264.
- Chesbrough, H.W., Garman, A.R., 2009. How open innovation can help you cope in lean times. *Harvard Business Review* 87, 68–76.
- Chocholik, J.K., Bouchard, S.E., Bouchard, J.K.H., Ostrow, D.N., 1999. The determination of relevant goals and criteria used to select an automated patient care information system. *Journal of the American Medical Information Association* 6 (May/June (3)), 219–233.
- Crabtree, A.D., DeBusk, G.K., 2008. The effects of adopting the balanced scorecard on shareholder returns. *Advances in Accounting* 24 (1), 8–15.
- Cruz, I., Scapens, R.W., Major, M., 2011. The localisation of a global management control system. *Accounting, Organizations and Society* 36 (7), 412–427.
- Davis, S., Albright, T., 2004. An investigation of the effect of balanced scorecard implementation on financial performance. *Management Accounting Research* 15 (2), 135–153.
- De Geuser, F., Mooraj, S., Oyon, D., 2009. Does the balanced scorecard add value? Empirical evidence on its effect on performance. *European Accounting Review* 18 (1), 93–122.
- Delbecq, A.L., Van de Ven, A.H., Gustafson, D.H., 1975. *Group Techniques for Program Planning: A Guide to Nominal Group and Delphi Processes*. Scott, Foresman, Glenview, IL.
- Evans, J.R., 2004. An exploratory study of performance measurement systems and relationships with performance results. *Journal of Operations Management* 22 (3), 219–232.
- Fitzgerald, L., Johnston, R., Brignall, T.J., Silvestro, R., Voss, C., 1991. *Performance Measurement in Service Businesses*. The Chartered Institute of Management Accountants, London.
- Franco-Santos, M., Kennerley, M., Micheli, P., Martinez, V., Mason, S., Marr, B., Gray, D., Neely, A., 2007. Towards a definition of a business performance measurement system. *International Journal of Operations & Production Management* 27, 784–801.
- Franco-Santos, M., Lucianetti, L., Bourne, M.C.S., 2012. Contemporary performance measurement systems: a review of their consequences and a framework for research. *Management Accounting Research* 23 (2), 79–119.
- Fry, T.D., Cox, J.F., 1989. Manufacturing performance; local versus global measures. *Production and Inventory Management Journal* 30 (2nd Quarter (2)), 52–56.
- Gattorna, J., 2006. *Living Supply Chains: How to Mobilize the Enterprise Around Delivering What Your Customers Want*. Financial Times/Prentice Hall, Harlow, UK.
- Goleman, D., 2009. *Ecological Intelligence: The Coming Age of Radical Transparency*. Penguin Books, London.
- Gunasekaran, A., Patel, C., McGaughey, R.E., 2004. A framework for supply chain performance measurement. *International Journal of Production Economics* 87 (3), 333–347.
- Gunasekaran, A., Patel, C., Tirtiroglu, E., 2001. Performance measures and metrics in a supply chain environment. *International Journal of Operations and Production Management* 21, 71–87 (check).
- Harrington, L.H., Boyson, S., Corsi, T.M., 2011. *X-SCM: The New Science of X-treme Supply Chain Management*. Routledge, New York, NY.
- Hall, R.W., 1983. *Zero Inventories*. Dow, Jones-Irwin, Homewood, IL, USA.
- Hayes, R.H., Abernathy, W.J., 1980. Managing our way to economic decline. *Harvard Business Review* 62, 95–101.
- Hayes, R.H., Garvin, D.A., 1982. Managing as if tomorrow mattered. *Harvard Business Review* 60 (May/June (3)), 70–79.
- Hayes, R.H., Wheelwright, S.C., 1984. *Managing as if Tomorrow Mattered*. John Wiley & Sons Inc., Toronto, Canada, pp. 9.
- Hoque, Z., 2004. A contingency model of the association between strategy, environmental uncertainty and performance measurement: impact on organizational performance. *International Business Review* 13 (4), 485–502.
- Hoque, Z., James, W., 2000. Linking balanced scorecard measures to size and market factors: impact on organizational performance. *Journal of Management Accounting Research* 12, 1–17.
- Hull, C.E., Rothenberg, S., 2008. Firm performance: the interactions of corporate social performance with innovation and industry differentiation. *Strategic Management Journal* 29, 781–789.
- Ittner, C.D., Larcker, D.F., 1998. Are nonfinancial measures leading indicators of financial performance? An analysis of customer satisfaction. *Journal of Accounting Research* 36, 1–35.
- Ittner, C.D., Larcker, D.F., Randall, T., 2003. Performance implications of strategic performance measurement in financial service firms. *Accounting, Organizations and Society* 28 (7–8), 715–741.
- Johnson, H.T., Kaplan, R.S., 1987. *Relevance Lost: The Rise and Fall of Management Accounting*. Harvard Business School Press, Boston, MA.
- Johnson, H.T., 1992. *Relevance Regained*. The Free Press, New York, NY.
- Kaplan, R.S., 1984. The evolution of management accounting. *Accounting Review* 59 (3), 390–418.
- Kaplan, R.S., 1986. Accounting lag: the obsolescence of cost accounting systems. *California Management Review* 18 (Winter (2)), 174–199.
- Kaplan, R.S., Norton, D.P., 1992. The balanced scorecard – measures that drive performance. *Harvard Business Review* 70 (January/February (1)), 71–79.
- Kaplan, R.S., Norton, D.P., 1993. Putting the balanced scorecard to work. *Harvard Business Review* 71 (September/October (5)), 134–147.
- Kaplan, R.S., Norton, D.P., 1996. Using the balanced scorecard as a strategic management system. *Harvard Business Review* (January/February), 75–85.
- Kaplan, R.S., Norton, D.P., 2001. *The Strategy Focused Organization: How Balanced Scorecard Companies Thrive in the New Business Environment*. Harvard Business School Press, Boston, MA, USA.
- Kennerley, M., Neely, A., 2002. A framework of the factors affecting the evolution of performance measurement systems. *International Journal of Operations and Production Management* 22 (11), 1222–1245.
- Kennerley, M., Neely, A., 2003. Measuring performance in a changing business environment. *International Journal of Operations and Production Management* 23 (2), 213–229.
- Klassen, R.D., Whybark, D.C., 1994. Barriers to the management of international operations. *Journal of Operations Management* 11 (4), 385–396.
- Lee, H.L., 2004. The triple—a supply chain. *Harvard Business Review* 82 (October (10)), 102–111.
- Lehtinen, J., Ahola, T., 2010. Is performance measurement suitable for an extended enterprise? *International Journal of Operations and Production Management* 30 (2), 181–204.
- Linstone, H.A., Turoff, M., 1975. *The Delphi Method: Techniques and Applications*. Addison-Wesley, Reading, MA.
- Locke, E.A., Latham, G.P., 2009. Has goal setting gone wild, or have its attackers abandoned good scholarship? *Academy of Management Perspectives* 23 (1), 17–23.
- Loughlin, K.G., Moore, L.F., 1979. Using Delphi to achieve congruent objectives and activities in a paediatrics department. *Journal of Medical Education* 54 (2), 101–106.
- Lusch, R., Vargo, S., O'Brien, M., 2007. Competing through service: insights from service-dominant logic. *Journal of Retailing* 83 (1), 5–18.
- Lynch, R.L., Cross, K.F., 1991. *Measure Up – The Essential Guide to Measuring Business Performance*. Mandarin, London.
- Magretta, J., Stone, N., 2002. *What is Management?* The Free Press, New York, NY.
- Marr, B., Adams, C., 2004. The balanced scorecard and intangible assets: similar ideas, unaligned concepts. *Measuring Business Excellence* 8 (3), 18–27.
- McKenna, H.P., 1994. The Delphi technique: a worthwhile research approach for nursing? *Journal of Advanced Nursing* 19, 121–1225.
- Melnyk, S.A., Davis, E.W., Spekman, R.E., Sandor, J., 2010. Outcome-driven supply chains. *MIT Sloan Management Review* 51 (2), 33–38.
- Meredith Jack, R., Raturi, A., Amoako-Gyampah, K., Kaplan, B., 1989. Alternative research paradigms in operations. *Journal of Operations Management* 8 (4), 297–326.
- Miles, R.E., Snow, C., 1978. *Organizational Strategy, Structure and Process*. McGraw Hill, New York, NY.
- Miles, R., Snow, C., Meyer, A., Coleman Jr., H., 1978. *Organizational strategy, structure and process*. *Academy of Management Review* 3 (3), 546–562.
- Miller, J.G., Vollmann, T.E., 1985. The hidden factory. *Harvard Business Review* 63 (September/October (5)), 142–150.
- Mintzberg Water, 1985. Of strategies deliberate and emergent. *Strategic Management Journal* 6 (3), 257–272.
- Neely, A.D., Mills, J.F., Gregory, M.J., Platts, K.W., 1995. Performance measurement system design – a literature review and research agenda.

- International Journal of Operations & Production Management 15 (4), 80–116.
- Neely, A.D., Mills, J.F., Platts, K.W., Richards, A.H., Gregory, M.J., Bourne, M.C.S., Kennerley, M.P., 2000. Performance measurement system design, developing and testing a process based approach. *International Journal of Production and Operations Management* 20 (9), 1119–1145.
- Nørreklit, H., 2000. The balance on the balanced scorecard a critical analysis of some of its assumptions. *Management Accounting Research* 11 (1), 65–88.
- Nutt, P.C., 1984. A strategic planning network for non-profit organizations. *Strategic Management Journal* 5 (January/March (1)), 57–75.
- Otley, D., 1999. Performance management: a framework for management control systems research. *Management Accounting Research* 10 (4), 363–382.
- Olive, N., Roy, J., Wetter, M., 1999. *Performance Drivers: A Practical Guide to Using the Balanced Scorecard*. John Wiley & Sons, UK.
- Ordonez, L.D., Schweitzer, M.E., Galinsky, A.D., Bazerman, M.H., 2009. Goals gone wild: the systematic side effects of overprescribing goal setting. *Academy of Management Perspectives* 23 (1), 6–16.
- Papalexandris, A., Ioannou, G., Prastacos, G.P., 2004. Implementing the balanced scorecard in Greece: a software firm's experience. *Long Range Planning* 37 (4), 351–366.
- Pavlov, A., Bourne, M.C.S., 2010. Explaining the effects of performance measurement on performance: an organizational routines perspective. *International Journal of Operations and Production Management* 31 (1), 101–122.
- Piercy, N.F., Cravens, D.W., 2000. The imperatives of value-driven strategy. *Journal of Change Management* 1 (1), 22–40.
- Pink, D.H., 2005. *A Whole New Mind: Moving from the Information Age to the Conceptual Age*. Riverhead Books, New York, NY.
- Pohle, G., Hittner, J., 2008. *Attaining Sustainable Growth Through Corporate Social Responsibility*. IBM Institute for Business Value, New York, NY.
- Poole, M.S., Van de Ven, A.H., 1989. Using paradox to build management and organizational theories. *Academy of Management Review* 14 (1), 562–578.
- Rayner, S., 2003. Democracy in the age of assessment: reflections on the roles of expertise and democracy in public-sector decision making. *Science and Public Policy* 30 (3), 163–170.
- Reuters, 2008. AMR research's supply chain top 25 beats market with 17. 89% return, <http://www.reuters.com/article/pressRelease/idUS133675+10-Jan-2008+PRN20080110> (10.01.08).
- Rigby, D., Bilodeau, B., 2009. *Management Tools and Trends*. Bains and Co., Boston, MA.
- Ritchie, R., Brindley, C., 2007. Supply chain risk management and performance: a guiding framework for future development. *International Journal of Operations & Production Management* 27 (3), 303–322.
- Gronroos, C., 1997. Value-driven relational marketing: From products to resources and competencies. *Journal of Marketing Management* 13 (5), 417–419.
- Schein, E.H., 2004. *Organizational Culture and Leadership*. Jossey-Bass, San Fran, CA.
- Schmidt, R.C., 1997. Managing Delphi surveys using nonparametric statistical techniques. *Decision Sciences* 28 (Summer (3)), 763–774.
- Skinner, W., 1974. The decline, fall and renewal of manufacturing. *Industrial Engineering* 52 (October (5)), 32–38.
- Slater, S.F., Narver, J.C., 2000. Intelligence generation and superior customer value. *Journal of the Academy of Marketing Science* 28 (1), 120–127.
- Treacy, M., Wiersema, F., 1993. Customer intimacy and other value disciplines. *Harvard Business Review* 71 (January–February (1)), 84–93.
- Tuomela, T., 2005. The interplay of different levers of control: a case study of introducing a new performance measurement system. *Management Accounting Research* 16 (3), 293–320.
- Turney, P.B.B., Anderson, B., 1989. Accounting for continuous improvement. *Sloan Management Review* 30 (Winter (2)), 37–47.
- Ulhøi, J.P., 2004. Open source development: a hybrid in innovation and management theory. *Management Decision* 42 (9), 1095–1114.
- Van der Stede, W.A., Chow, C.W., Lin, T.W., 2006. Strategy, choice of performance measures, and performance. *Behavioural Research in Accounting* 18, 185–205.
- Vandermerwe, S., Rada, J., 1998. Servitisation of business: adding value by services. *European Management Journal* 6 (4), 314–324.
- Venkatraman, N., 1997. The concept of fit in strategy research: toward verbal and statistical correspondence. *Academy of Management Review* 14 (3), 423–444.
- Waddock, S.A., Graves, S.B., 1997. The corporate social performance-financial performance link. *Strategy Management Journal* 18 (4), 303–319.
- Whitman, N.I., 1990. The committee meeting alternative using the Delphi technique. *Journal of Nurse Administration* 20 (7/8), 30–36.
- Woodruff, R., 1997. Customer value: the next source of competitive advantage. *Journal of the Academy of Marketing Science* 25 (2), 139–153.