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A Review of Performance Measurement: towards Performance Management

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Abstract

Describes the evolution of performance measurement in four sections: recommendations, frameworks, systems, and inter-organisational performance measurement. Measurement begins with a recommendation, which is a piece of advice related to the measures or structure of performance measurement; frameworks can be dichotomised into a structural and procedural typology that suggests structural framework development has outstripped procedural framework development. The basic requirements for a successful PM system are two frameworks - one structural, and one procedural; as well as a number of other performance management tools. Inter-organisational performance measurement may be divided into supply chain and Extended Enterprise performance measurement: the former relying solely on traditional logistics measures, while the latter incorporates the structural aspects of the supply chain system and adds non-logistics perspectives to its measurement arena. Finally the encroachment of the performance measurement literature into the processes related to performance management is examined, and areas for future research are suggested.

Keywords: *Recommendations; Frameworks; Systems; Inter-organisational Performance Measurement; Performance Management*

1. Introduction

Organisational Performance has always exerted considerable influence on the actions of companies. Consequently, the *ways* and *means* of accurately measuring this performance is perceived as being an increasingly important field of research for both organisations and academics alike. Indeed, in the last fifteen years or so Performance Measurement (PM) has been seen to occupy the minds of academics in an ever-increasing number of fields. The mid to late nineties seem to have seen the peak of this activity. Neely [63] estimated that between 1994 and 1996, some 3,615 articles on performance measurement were published alongside the statistic that in 1996 books on the subject appeared at a rate of one every two weeks in the USA alone. A vast array of disparate information concerning PM has been made available through the efforts of a number of researchers in different functional silos [58] and the field is now well recognised as being an important part of the manufacturing strategy literature [20]. As a consequence of this flourishing PM research, however, organisations and academics are facing a comprehension predicament: it has been suggested that the multi-disciplinary character of the research is hindering developments in the field of PM [58, 64]; while the fact that PM is not owned by academics in any particular discipline has resulted in a reluctance to leave behind traditional functional boundaries when research upon the topic is performed [63]. The results have been an abundance of isolated PM information produced that may be duplicated and / or contradictory in nature.

PM is also evolving at a considerable rate to combat new organisational realities; owing to the fight for industrial supremacy, the concept of performance, as it is measured and evaluated, is undergoing a transformation in modern business organisations. The external environment is

becoming identified as the next frontier of PM: in the coming years there is expected to be a significant increase in inter-organisational PM developments – such as supply chain PM and, more particularly, Extended Enterprise PM. The Extended Enterprise is a formation of closer co-ordination in the design, development, costing and the co-ordination of the respective manufacturing schedules of co-operating independent manufacturing enterprises and related suppliers [37]; and is the consequent result of a move away from the traditional view of manufacturing companies with clear boundaries, limited relationships with other companies and a focus on internal efficiency and effectiveness only [15]. This is having a profound impact upon PM practices in many organisations - an impact that is starting to be felt in the PM literature.

The purpose of this paper is to contribute towards the clarifying vision of PM as espoused by Neely [63], and, more latterly, Marr and Schiuma [58]. The diverse nature of the review that follows is indicative of the richness of the PM literature, which, for clarification purposes, has been divided into a number of sections so that the evolution and development of PM can be comprehended. In the following section, PM recommendations - the initial starting-point of all PM initiatives – are briefly reviewed; then a review of PM frameworks and their categorisation into a structural / procedural typology is performed; this is then followed by a brief examination of the PM systems literature. The literature upon supply chain and Extended Enterprise PM initiatives is then examined, followed by a theoretical discussion of the evolving PM literature's place in the distinct concept of performance management. Given the exploratory nature of this paper, some future research areas are suggested in the conclusions that complete the article.

2. Performance Measurement Recommendations

The initial building blocks of all PM initiatives – be they PM frameworks or PM systems - may be termed *PM recommendations*. PM begins with a recommendation, which is a piece of advice related to the discipline of PM - its measures or its structure, for example. When a series of these recommendations have been collected, a PM framework may be developed which use these recommendations as the basis for development. Recommendations concerning PM can be divided into two core areas:

- Recommendations for performance measures; and
- Recommendations and issues for PM framework and system design.

The first places emphases upon the requirements of good performance measures, while the second examines the recommendations that have been made regarding the design and development of PM frameworks and systems. Recommendations that represent a spin-off from the first core area are those that attempt to document the process of *selecting* performance measures, which pre-suppose particular selection mechanisms are in place. Since the *procedure* of selecting a particular performance measure is, to a certain extent, a subjective process - often involving top management sitting around a table and choosing one measure from a number of alternatives – more research is required upon the actual *selection* activity. Kaplan and Norton [38] have suggested a series of workshops and interviews to meet this purpose, while Neely et al. [67] have described a pilot process, consisting of a number of subjective phases – ranging from check sheets to brainstorming – in a 12 phase model to overcome selection issues.

Many of the most popular recommendations concerning performance measures date from the late eighties and early nineties when PM as a concept was being formed. These basic recommendations set forth what different researchers hoped to see with regard to performance

measures as they were used in company performance measurement systems. As Neely et al. [68] has already provided a comprehensive overview of many of these recommendations as they have appeared in the literature, they are not repeated here. Other commentators not included by Neely et al.'s research include Stalk and Hout [75] who offer two rules for performance measures: 1) the measure should be kept physical (i.e. quantitative), and 2) the measure should be taken as close to the customer as possible. Band [3] proposes that performance measures should:

- Have top management support;
- Involve employees in their development (particularly customer satisfaction measures);
- Ensure that those measures used are relevant to managers and employees in performing their day-to-day jobs;
- Be part of a feedback loop that links them to manager and employee performance appraisals.

Maskell [59] suggests that new world-class performance measures should:

- Primarily use non-financial performance techniques;
- Vary between locations;
- Change over time as the company needs change;
- Are intended to foster improvement rather than just monitoring.

A considerable amount of disparate research has been carried out upon the issues required to develop successful PM frameworks and systems. Table 1 groups together the different recommendations for the design of frameworks and systems proposed by various researchers in the field.

Insert Table 1 here…

Neely et al. [67] has complained that much of the current research on PM, and the writings upon the design of systems and frameworks for PM in particular, have been too superficial. The above table suggests that actual serviceable advice that can be usefully employed for PM framework / system design is rare. This in turn has made the process of developing a single unifying system, which satisfies all the above issues, unrealistic.

3. Performance Measurement Frameworks

PM frameworks have arguably made the largest impact upon the PM literature, with a plethora of ever-more complex framework models being developed in many fields since the late eighties. The term *framework* refers to the active employment of particular sets of recommendations: for example, a set of measurement recommendations may suggest the development of a structural framework (e.g. Balanced Scorecard [42]), or they may give rise to a procedural framework (e.g. Wisner and Fawcett [77] framework). A performance measurement framework assists in the process of performance measurement system building, by clarifying performance measurement boundaries, specifying performance measurement dimensions or views and may also provide initial intuitions into relationships among the performance measurement dimensions [71]; two types may be envisaged: the structural framework (i.e. a framework specifying a typology for performance measure management); and the procedural framework (i.e. a step-by-step process for developing performance measures from strategy). Essentially, a *framework* provides us with more information about PM than a *recommendation*, but less about the actual PM process than a *system*.

One of the first frameworks put forward for the process of PM was by Sink and Tuttle [73], which describes a six-step procedure for PM in the planning phase. Keegan et al. [46] presented the structural *performance measurement matrix* that examined external/internal and cost/non-cost performance measures, while the *results and determinants framework* - proposed by Fitzgerald et al. [26] – has as its core performance measure management typology the distinction between *measures of results* and *measures of the determinants of the results*. Lockamy III [53] has proposed four theoretical performance measurement system models for the dimensions of cost, quality, lead time and delivery, based upon research into the linkages between operational and strategic PM systems in a small number of world-class manufacturing companies [79]; Lynch and Cross [57] proposed the structural *performance pyramid*, which highlights a hierarchical view of business performance measurement, and a ten step procedural model [56] to describe what needs to be done in terms of PM. Similar to Lockamy III, Azzone et al. [2] have focused upon developing structural PM models to suit specific competitive priorities (i.e. time, cost etc.); their framework seeks to identify suitable measures based upon an internal / external division. Both Kaydos [45] and Wisner and Fawcett [77] have proposed procedural stepwise framework models, while the structural *Balanced Scorecard* [42] attempts to introduce the concept of producing a "balanced" set of measures (i.e. non-financial measures "balanced" against financial measures). The structural AMBITE performance measurement cube [11] presents a tri-axis cube onto which are mapped three dimensions: business processes, competitive priorities, and manufacturing typology. Brown [14] developed a structural framework which attempts to distinguish between input, process, output and outcome measures; while the structural PM framework of the European Foundation for Quality Management (*EFQM*) consists of two segments - enablers and results – which may be further sectioned. Hudson et al. [35] have examined the problems associated with PM for SMEs (Small to Medium sized Enterprises) and

have proposed a procedural framework specifically tailored to their needs; Neely et al. [65] propose the structural *Performance Prism*, which consists of five weighted "faces": stakeholder satisfaction, strategies, processes, capabilities, and stakeholder contribution. Yeniyurt [78] has proposed a structural framework for PM in companies that are geographically dislocated; the model uses a cross-process and cross-border approach, and five levels of measurement performance: financial; consumer; internal processes; innovation; and corporate culture / climate. Rouse and Putterill [71] have developed the structural *integrated performance measurement framework,* which attempts an integration of a number of structural frameworks, and includes a set of principles that should be considered alongside the framework.

Table 2 outlines these major PM frameworks further. As may be seen from the table, the main emphasis in PM framework design has been upon structural framework development, which has considerably outstripped the pace of procedural PM framework development. The subjective difficulties and vagueness associated with the development of *procedures* in PM may be the reason for this. The table also emphasises that, although PM frameworks have become increasingly more complex in terms of measurement scope (for example, Sink and Tuttle [73] attempted to measure in one functional area (planning), while Rouse and Putterill [71] have attempted to integrate a number of frameworks), a truly holistic PM framework has, so far, been unrealisable. Attempts at producing a definitive PM framework have floundered because of the number of issues that are involved; PM frameworks that produce a systemised *procedure* towards PM, are handicapped by the absence of a *structural* element to allow for management and selection of individual performance measures; similarly, *structural* PM frameworks lack a *procedural* element. Structural and procedural PM frameworks are usually developed in isolation; they are only combined in PM *systems*. Structural PM frameworks are impeded by

being concerned solely with administrative and selection elements of the PM process. PM is also concerned with a *procedural* element, which helps to determine exactly *how* the process of PM should be carried out. Even those frameworks that have acknowledged this defect of previous PM frameworks (for example, Rouse and Putterill [67]) are insufficiently developed to be regarded as truly holistic.

Insert Table 2 here…

4. Performance Measurement Systems

In comparison to PM frameworks, there are very few PM systems in existence that have been academically developed. Most of the PM systems developed in companies are a collection of best practices that have been grafted onto various PM frameworks, and are found to work anywhere between very well indeed - to very badly. The basic requirements for a successful PM system are two frameworks - one structural, and one procedural; as well as a number of other performance management tools, such as lists of measures etc. In the following descriptions of academically-produced PM systems, the procedural work of Bradley [11] and Medori and Steeple [62] may be the most indicative of how many companies are actually approaching the concept of PM system design. Three academic PM systems are examined here, as being representative of the available PM systems' literature:

- The Balanced Scorecard PM system [42];
- BPR PM system [11];
- Medori and Steeple's [62] PM system.

The Balanced Scorecard framework is based upon four perspectives surrounding the company's vision and strategy [42]:

- Financial perspective;
- Customer perspective;
- Internal business perspective;
- Learning and Growth perspective.

Kaplan and Norton [44] provide an additional procedural framework through which the scorecard can be applied as a system - thus managing the firm's strategy. The framework is in four stages:

- "Translating the vision" is concerned with clarifying and gaining consensus over a version of the firm's strategic vision that is operational upon *all* levels of the organisation (i.e. from the top level down to local level).
- "Communicating and linking" is the process by which managers communicate their strategy up and down the organisation and link it to departmental and individual objectives.
- "Business planning" is the process by which companies integrate their business and financial plans.
- "Feedback and learning" gives companies the capacity for strategic learning; existing processes review whether individual and departmental financial goals have been achieved, while the balanced scorecard enables a company to monitor short-term results for its three additional perspectives.

This procedure is handled by a series of interviews and workshops that Kaplan and Norton [38] had outlined earlier. Finally, to emphasise the point, Kaplan and Norton [44] offer a case study of an engineering construction firm, where, over a 26 month period, a balanced scorecard was developed.

Kaplan and Norton's Balanced Scorecard PM system mainly consists of an extended PM system approach (upon a visionary / strategic high-level approach, and a lower more subjective interview / workshop approach), and PM framework focusing upon objectives, measures, targets and initiatives. No performance measures are explicitly pre-defined by the approach, which relies upon the system design methodology to formulate them during the system-building process. Case study research is used to imply how the process should be initiated and followed on. Further studies of Balanced Scorecard PM system design can be found in Butler et al. [16] and Cravens et al. [18].

Using the previously mentioned structural AMBITE performance measurement cube, Bradley [11] attempted a PM system that specifically addressed BPR (Business Process Reengineering) processes. The structural AMBITE performance measurement cube [11] presents a tri-axis cube onto which are mapped the following three dimensions:

- Business Processes – (first axis: customer order fulfilment, vendor supply, manufacturing, design co-ordination, co-engineering);
- Competitive priority – (second axis: time, cost, quality, flexibility, environment);
- Manufacturing environment – (third axis: Make-to-Stock (MTS), Assemble-to-Order (ATO), Make-to-Order (MTO), Engineer-to-Order (ETO)).

Each point within the cube is called a Strategic Performance Indicator (SPI). Theoretically, there are up to one hundred different SPIs possible from the cube, each consisting of one business process, one competitive priority and one manufacturing typology. These SPIs can then be broken down into lower level indicators, however the breakdown of each SPI will be different for every enterprise, to enable customisation of the performance indicators at the enterprise level. The (implied) procedural framework for PM system design may be illustrated as in Fig. 1. Using the company's strategy statement *Critical Success Factors* (CSFs - the desire of the company towards a specific objective) and *Customer Requirements* (CRs – the desire of the customer with regard to its dealings with the manufacturing enterprise) are derived. These CSFs and CRs are then fed into the AMBITE cube for SPI assessment. Each CSF and CR is related to a specific business process, manufacturing environment and macro measure of performance (for example, the CSF - shorten order delivery accuracy becomes a SPI consisting of the three cube dimensions: customer order fulfilment process, ATO, and time). These results are then tabulated for all CSFs and CRs.

Insert Figure 1 here…

At this stage a predefined set of performance measures arranged according to business process / macro measure of performance are introduced, and for each of the business processes of the CRs and CSFs, measures are selected. The final step for finding the critical performance measures for the company involves the introduction of a *Process Design Matrix*, which allows various forms of correlation and comparative analysis to be performed upon the relationships between the critical performance measures and the CSFs and CRs. This process enables the identification of critical performance measures and also shows a range of information surrounding them, which

can then be used to re-engineer business processes. Bradley [11] provides a case study to highlight the way his process works.

In general the PM system provided by Bradley [11] has included items that were new to performance measurement at the time. The addition of a separately, pre-defined list of performance measures removes much of the guess work inherent in other approaches, whereby performance measure identification and selection is built into the process. Pre-defined lists help to reduce the amount of subjectivity required of the PM system process, however it may result in a certain loss of flexibility of the methodology. Also pre-defined lists are apt to become old, due to the fact that no process for updating them is usually stipulated (for example if new competitive priorities are, in the future, identified the list of measures available must be updated to reflect this, or become outdated). Also, the use of a strategy statement by the PM system to identify CSFs and CRs may make it difficult to tie CSFs and CRs down to specific business processes or even to specific competitive priorities (for example, a company's strategy statement may be badly defined, or consist of a lot of intangible or abstract statements). Finally, the system described here (and especially its end results) are expressly designed for use alongside the BPR process; this makes the PM system context-specific, and not easily adaptable to other requirements.

Similar to this work, Medori and Steeple [62] have proposed a framework that embraces both the design and auditing of PM systems. Their *framework*, in reality, operates as a *system*: by replacing the requirement for a structural PM framework with the stipulation that they are measuring in areas related to six competitive priorities (quality, cost, flexibility, time, delivery, and future growth), and introducing a specially-designed procedural framework for PM system

design; they are effectively detailing the components of a system. The procedural PM framework follows six stages:

1. A company's manufacturing strategy is defined, and the strategic requirements (including customer requirements) are identified;
2. Strategic requirements are matched against competitive priorities;
3. Measures are then selected from a separate pre-defined list of performance measures (this separate list is not supplied, however we are told that it contains 105 mainly non-financial measures, with full descriptions and methods of calculation). Next is stage 4, which is omitted if the company has no existing PM system;
4. Audit – The existing set of measures is listed down and compared with the new measures that have been identified in the previous stage. Three rules are applied:
    - Existing measures that are congruent with new measures are kept and continually used;
    - Existing measures that are divergent with the new selected measures are deemed no longer relevant or useful to a company – they are scrapped;
    - New measures selected that do not tie with existing measures are implemented. They represent "gaps" in the PM system.
    - If no "gaps" are identified then stage 5 (next) is omitted.
5. Implementation of measures – An eight step plan is provided for company implementation of the new measures;
6. Periodic maintenance – The last stage of the system revolves around periodically reviewing a company's PM system.

Medori and Steeple [62] proceed to illustrate their PM system with a case study that took three months to complete from start to finish. Two problems identified with the system are:

- Difficulties can be found in relating a company's strategy to the performance measurement grid's competitive priorities;
- The separate pre-defined list of performance measures may become dated.

Both of these points are similar to the problems faced by the PM system proposed by Bradley [11].

The merits of the three academic systems are compared in Table 3; where it is clear that each PM system must have two PM frameworks (structural and procedural) that, when combined, produce the methodology which forms the pivot for various performance management aids, such as lists of performance measures, to be included within the system's boundaries. By making the system context-specific, like Bradley [11] did, means that there is more control upon the performance management tools that accompany the system; however, when the system sets no context-specific boundaries, the reach of performance management and the need to legislate for it so that it remains compatible with the system's environment, may become a difficult administrative task. For this very purpose, Kaplan and Norton have continued to supplement the basic Balanced Scorecard [42] structure and its surrounding performance management environment with a range of publications, including: case studies [38]; PM-based strategy interpretation [39, 43, 44]; and strategy plan development methodologies [40, 41]. These additional tools enable the dynamic nature of their PM system: the systems of both Bradley [11] and Medori and Steeple [62] suffer from a lack of surrounding performance management aids, with the exception of the provision of

a static list of performance measures, and the use of matrix and auditing steps that have been integrated into their respective systems.

Insert Table 3 here…

5. Inter-organisational Performance Measurement

The concept of designing a PM system specifically tailored to the requirements of inter-organisational PM (as opposed to intra-organisational PM – the systems and frameworks dealt with above) is, in general, a neglected but fast-growing facet of the PM literature. Current studies of inter-organisational PM usually focus upon supply chain PM; Extended Enterprise PM has been touched upon only briefly by the PM literature. A supply chain PM system focuses upon what are termed by Brewer and Speh [12] as traditional logistics performance measures (i.e. measures such as order fill rates, error rates, inventory costs, delivery time etc.). By focusing almost completely upon the logistics control system, supply chain PM cannot answer a number of wider-ranging, more holistic questions - for example: How effectively are the firms in the supply chain interacting? How does this supply chain fare compared to competing supply chains? How flexible is the entire supply chain in responding to requests for customised packages, orders and products? To what extent are decisions within the supply chain motivated by power rather than by mutual trust? [12]. These questions are tackled by an Extended Enterprise PM system, which, in effect, incorporates the structural aspects of the supply chain PM system and adds a number of non-logistic perspectives to its measurement arena (for example: internal process measures, intangible measures, measures of financial performance etc.). The supply chain PM system maintains a more traditional arms-length relationship with suppliers and customers by requesting

data only upon issues of immediate concern from the logistics functions of participating companies. The Extended Enterprise PM system may theoretically present data from *all* aspects of the participating companies' functions. However developing an Extended Enterprise PM system also requires the development of a robust conceptual supply chain PM framework; thus the two concepts are integral to each other.

The concept of inter-organisational PM has had a very fragmented history of development within the literature. Fawcett et al. [25] were among the first to suggest that measurement systems should extend competitive strategy into the areas of supply chain integration (upstream) and to align with customer requirements (downstream). In areas such as new product development [70], quality [54] and the environment [61] the use of performance measures is seen as an important requirement. Beamon [5], reviewing previous supply chain design models, suggests that the most used competitive priorities were cost (and hybrids of cost: with time, or with customer responsiveness), followed by customer responsiveness and flexibility. The quantitative nature of cost makes it more appealing than other measures such as flexibility and customer responsiveness, which are qualitative in nature. Beamon [5] concludes that it is unlikely that a single performance measure will be adequate for an entire supply chain, and that a *system* of performance measures is required for accurate measurement of supply chain systems. Kleijnen and Smits [48] have analysed how economic theory has treated multiple supply chain performance measures, and has shown that, within this theory, these may ultimately be – through the use of various aggregating scoring methods - aggregated into one final performance measure, termed *utility*. Holmberg [34] has suggested that a lack of systems thinking has plagued supply chain PM system design and development: he suggests that measurement activities in the supply chain should not be managed as one system, but as several independent, fragmented, firm-sized

systems that are ultimately managed, upon the supply chain level, through the co-ordination of information exchange. Kleijnen and Smits [48], using the Balanced Scorecard approach, postulate that since each company is an economic – and legal – entity, each should have its own scorecard, while communication and co-ordination within the supply chain should be applied to overcome the obstacles created by this independent scorecard development process.

A preliminary framework for a supply chain measurement system was proposed by van Hoek [76]. This framework provides a first indication of how, in the supply chain approach to PM, the content of a measurement system may differ, depending on the supply chain operating format and strategy approach or the evolution of strategies; it points out that supply chain PM systems may have to be developed to suit different levels and that a-one-size-fits-all approach will probably not do. Beamon [6] suggests that a new framework for supply chain PM can be derived from the use of three measures: resources, output and flexibility. The three types of measure have different goals, but it is important for overall performance success of the supply chain for the three to be measured. Lapide [49] proposes a two-tier supply chain PM framework, which depicts the relationship between what the author terms *Executive-level metrics* and *Managerial-level metrics* in the supply chain. The former can be considered to be cross-functional (and inter-organisational), process-based measures; the latter are function-based, diagnostic measures. Dreyer [22] has suggested a three-step supply chain PM framework (with associated advice) to develop a successful supply chain PM system; and Gunasekaran et al. [33] have developed a supply chain PM framework which is reminiscent of the SCOR model, in that its uses a variant of the entities plan, source, make and deliver: the framework provides a set of sample supply chain performance measures based upon previous work where they have been classified into operational, tactical and strategic groupings. Basu [4] proposes a six-step cycle framework in

order to implement and sustain the benefits of a performance management system with new measures (i.e. measures for the extended supply chain); while Chan and Qi [17] propose a process-based PM framework for the supply chain, based upon six so-called "processes": suppliers, inbound logistics, core manufacturer, outbound logistics, marketing & sales and end customers. Each of these processes is subjected to a decomposing process that progressively decomposes the process into sub-processes and activities; and decomposes the associated goals and responsibility functions into ever-more detailed prescriptions. Measurements may then be applied to the activities which, in turn, may be aggregated upwards into sub-processes, and finally into the core process.

The first significant Extended Enterprise PM framework that has attempted to move beyond the use of "traditional logistics performance measures" solely - as in supply chain PM frameworks – is located in the work of Brewer and Speh [12, 13]. Having complained about the drawbacks of using these logistics-focused measures only, they proceeded to develop a four-perspective model of the supply chain management process, which they then integrated with the four perspectives of the Balanced Scorecard. The framework developed moves beyond more traditional supply chain PM frameworks by expanding the concept of the internal perspective of the scorecard to include inter-functional and partnership perspectives. Many of the measures thus produced are new or unfamiliar. The second approach towards an effective Extended Enterprise PM framework is located in the work of the AMBIT approach [36]. Based upon the framework developed in the AMBITE project, this approach chooses performance measures in a similar fashion to the BPR PM system advocated by Bradley [11] that was reviewed previously. The AMBIT approach suggests that the PM initiative should be linked to the participating companies' ERP systems, which will enable the PM system developed to tap directly into the data available, thus greatly

facilitating the measurement process. The AMBIT approach is an example of a PM framework that relies upon the power of previously developed applications (i.e. the ERP system) to spread the basic procedures inherent in the AMBIT process. Thus, by developing itself as another application layer drawing its data from the ERP system, participating companies in an Extended Enterprise will automatically use the AMBIT PM framework as the basis for their respective performance measure development.

Besides the attempts to develop inter-organisational PM frameworks described above, others have attempted to extend intra-organisational PM frameworks into the inter-organisational arena. Cravens et al. [18] have used the Balanced Scorecard concept in their assessment of strategic alliances based upon previous efforts by Kaplan and Norton [44] with joint ventures. However it should be noted that these attempts and similar efforts with other PM frameworks are relatively rare. As Lee [52] suggests, interface activities with other companies, based upon the use of internal measures solely, may fall through the cracks because neither partner may be actively measuring the performance of those activities. In general, extending intra-organisational PM systems into the domain of inter-organisational PM has meant paying lip service only to the concept of supply chain PM [4]. Intra-organisational PM systems are not designed to measure beyond the boundaries of the organisation (beyond simple measures such as delivery time etc.), and using them to try to do this over-simplifies the inter-organisational perspective. The additional complexities of inter-organisational collaboration (especially issues such as trust and co-operation) put new strains upon PM frameworks that were not designed for supply chain PM in the first place. Lohman et al. [55] have pointed out various barriers to designing and implementing supply chain-wide PM systems:

- Decentralised, operational reporting history;

- Deficient insight in cohesion between metrics;
- Uncertainty about what to measure;
- Poor communication between reporters and users;
- Dispersed information technology infrastructure;

Many of these problems may be removed by a common platform from which all members of the supply chain can draw knowledge.

6. Towards Performance Management

Facilitated by hindsight, a somewhat linear evolution of the PM literature has been described in the sections above - an evolution that, however, has not occurred in reality. The development of PM as a series of recommendations, which in turn give rise to PM frameworks, and then PM systems, is not borne out in research: Marr and Schiuma [58] suggest that the present body of knowledge is widely diverse, and needs to be continually developed into a cohesive body in order to become more effective. The reasons for this wide diversity in the PM literature must be examined further. As a discipline, PM can be seen to be growing in depth – indeed, to make sense of how wide it has grown over the last 15 years or so, an examination of its position within the distinct concept of *performance management* must be performed. Amaratunga and Baldry [1] define performance management as the use of performance measurement information to effect positive change in organisational culture, systems and processes, by helping to set agreed-upon performance goals, allocating and prioritising resources, informing managers to either confirm or change current policy or programme directions to meet these goals, and sharing results of performance in pursuing those goals. Performance measurement and performance management

follow one another in an iterative process; management both precedes and follows measurement, and in doing so creates the context for its existence [51]. Fig. 1 presents a simplified schematic representation of the performance management process, as depicted by Smith and Goddard [74].

Insert Figure 2 here…

A decade ago the PM literature was often content with trying to represent the processes defined by the three inner boxes of Fig. 2 - labelled measurement, analysis and response. As time has passed more complex frameworks and systems have evolved so that, today, the whole of the above figure is almost encompassed. PM today has moved towards examining the organisation as a whole, and impacting, to a greater extent, upon strategy. Finally inter-organisational PM systems will have an impact outside the organisation – in the external environment – the final frontier of PM. In the coming years there will be a significant increase at the inter-organisational PM level, whereby supply chain PM and, more particularly, Extended Enterprise PM concepts will be examined in greater detail. Thus, owing to the continual encroachment of the PM literature into areas previously thought to be the exclusive property of the performance management process, the two literatures are increasingly becoming synonymous. Fig. 3 depicts this evolutionary process of PM.

Insert Figure 3 here…

For both *intra-organisational* and *inter-organisational* PM, this evolutionary process can be examined in closer detail (see Fig. 4). In general, both types of PM share the same basic foundation in PM recommendations, and some intra-organisational PM frameworks have been

applied to the inter-organisational domain (e.g. Balanced Scorecard). However, inter-organisational PM (particular Extended Enterprise PM) is a much more complicated process than its internally-focused companion because it 1) attempts to merge two differing concepts: PM and the EE paradigms, for example; thus introducing new processes (and associated problems) into the PM domain; and 2) tries to focus upon external measuring concepts *plus* internal measuring concepts.

Insert Figure 4 here…

If the evolutionary process of PM outlined above is accepted, then a number of challenges may still face the discipline in the future. At the inter-organisational level the more widely accepted supply chain PM ideology may be resulting in the disparate development of PM systems at the intra-organisational and inter-organisational levels to suit the requirements of both internal and external measurement responsibilities. Sustained development of separate measurement systems at this level may result in data and information duplication, and possibly incompatibilities in integrating the systems together. At a lower level the development of disparate measurement systems may result in the superfluous duplication and implementation of a number of incompatible PM frameworks. This process is depicted in Fig. 5.

Insert Figure 5 here…

The development at the PM systems level of an integrated measurement system employs the use of the concept of the Extended Enterprise, which promotes the development of one all-embracing PM system using the least amount of structural and procedural PM frameworks possible; see Fig.

6. The concept of Extended Enterprise PM was first espoused by O'Neill and Sackett [69], but it remains one of the most under-developed aspects of the Extended Enterprise concept. Moving beyond the supply chain PM concept requires an Extended Enterprise mindset, which emphasises a collaborative win-win policy between respective supply chain partners, and is not based totally upon zero-sum performance measures such as those of cost (i.e. lowest cost) and time (i.e. fastest time), as promoted by some of the researchers in the above review. Further, the recent uptake in outsourcing non-core competences has had an un-researched impact upon existing PM systems in companies: for example, the difference outsourcing has made to performance measures and the dynamics of internally-oriented PM systems, and the ability of the PM system to successfully cope with and reflect these changes is unknown. Increasingly companies will be forced to measure outsourced competences with Extended Enterprise PM where the *health* of respective suppliers and customers (up and downstream) is of more immediate importance.

Insert Figure 6 here…

7. Conclusions

This paper tackles what Marr and Schiuma [58] have termed the "diverse" body of literature upon PM, by providing an overview of the evolution of the concept of PM, from its modern beginnings to the various recommendations, frameworks and systems that have been developed under its umbrella. Further evolutions of the PM literature are indicated in the inter-organisational PM research, which is here dichotomised into supply chain PM and Extended Enterprise PM. Although diverse, the PM literature shows clear tendencies to merge with the separate body of performance management research, as – throughout its evolution – it has continually encroached

upon areas that that research influences. The immediate future of PM research may increasingly lie in its inter-organisational context: as researchers are beginning to realise the impossibility of developing an intra-organisational all-encompassing PM solution [71], attention is turning to how inter-organisational PM will impact upon the research that has already taken place at the intra-organisational level; much of the latter research may have been in vain as inter-organisational concepts may result in incompatibilities with the existing literature upon intra-organisational PM. The requirements, therefore, for the future of PM is an inter-organisational PM policy – preferably at the Extended Enterprise level – that is able to accommodate the existing (and widely adopted and used) stream of intra-organisational PM developments within its context. More specifically, a possible future research agenda may include answers to:

- What effect has the recent surge to treat many business functions under our control (and therefore under the direct influence of our PM system) as outsourced elements (and therefore can only be measured by proxy, through inter-organisational measurement) had upon the firm's PM system?
- Just how far may we extend *intra-organisational* PM systems to the *inter-organisational* supply chain before "measures fall through the cracks" and are not actually being actively measured?
- What impact will *inter-organisational* PM system development have upon existing *intra-organisational* PM systems? Will they have to be scrapped in their entirety, or can inter-organisational PM systems be built to accommodate existing internal-looking systems?
- What will be the effect of building an inter-organisational PM system using Holmberg's [34] systems thinking concept? Can a system be built upon the (apparently) contradictory theory of fragmented firm-sized PM systems that, when integrated together, form a

holistic PM system? Can this system be built where a situation exists within the supply chain of different PM frameworks and PM systems being actively used by the participating companies?

- Is the Balanced Scorecard the *de facto* choice for PM between organisations? Can other frameworks be used just as profitably, or is the concept of "balancing" measures the key to the solution for inter-organisational PM? Zimmermann [80] notes, upon this point, that whereas intra-organisational Balanced Scorecards maintain a "balance" between financial and non-financial performance measures, inter-organisational Balanced Scorecards try to maintain a "balance" between internal measures (i.e. the firm's measures – "our" measures) and external measures (i.e. beyond the four walls of the factory – in the supply chain). Consequently there is a fundamental shift in the thinking when the Balanced Scorecard is applied to the supply chain.
- What are the ultimate frontiers for the PM discipline? As PM and performance management follow one another in an iterative process [51], how will inter-organisational performance management manifest itself to compliment the inter-organisational PM requirements currently under development?

Figures

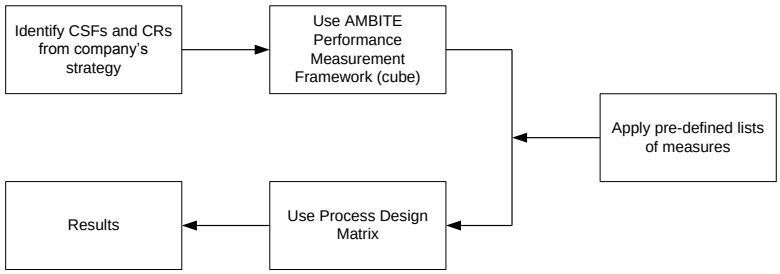

Fig. 1. PM design system as used by Bradley (adapted from [11]).

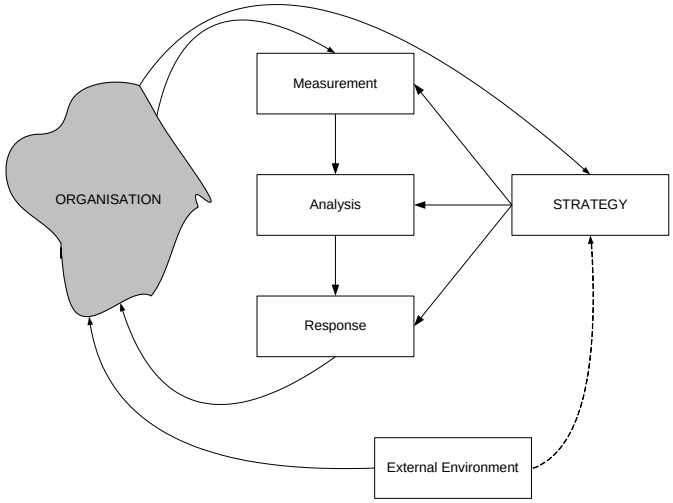

Fig. 2. Schematic representation of the performance management process [74].

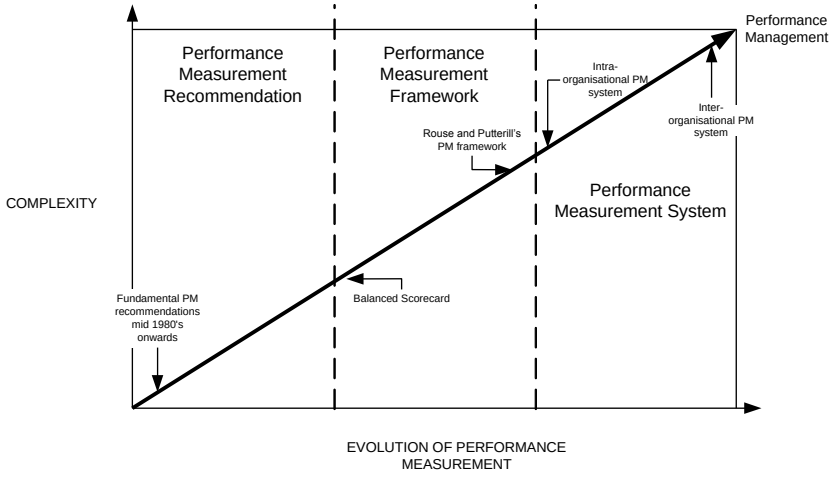

Fig. 3. The evolutionary process of Performance Measurement.

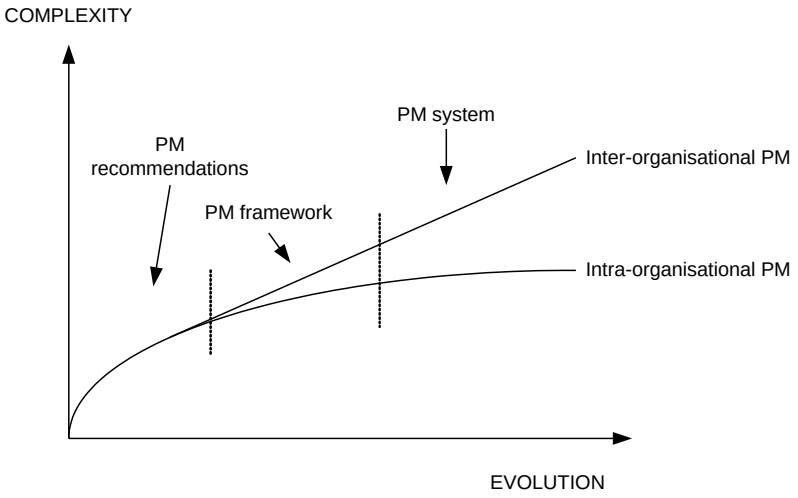

Fig. 4. The evolution of intra-and inter-organisational Performance Measurement.

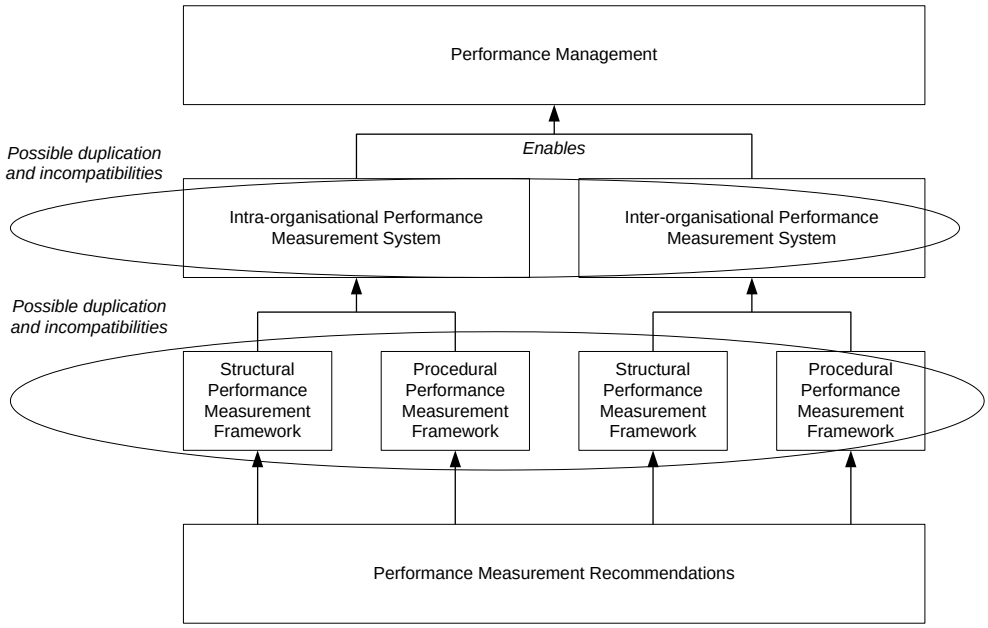

Fig. 5. The evolution of supply chain Performance Measurement.

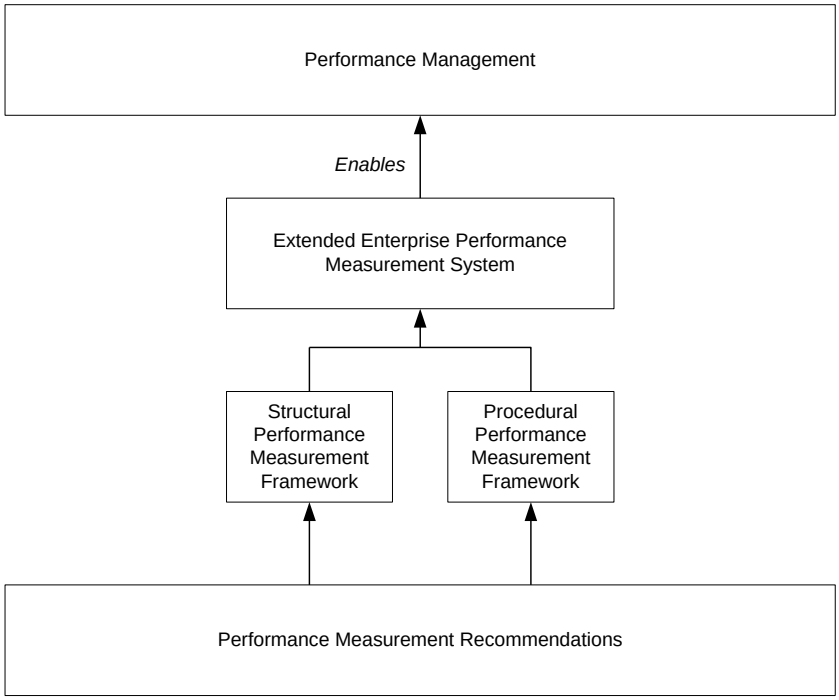

Fig. 6. The evolution of Extended Enterprise Performance Measurement.

Tables

Table 1

Recommendations for the design and development of Performance Measurement frameworks and systems

	Recommendation	**Researcher**
1	Should be based upon the strategic role of the company	[2, 9, 21, 24, 32, 42, 47, 62]
2	Should be based upon multi-criteria (critical activities)	[2, 19, 66]
3	Criteria should evaluate group not individual work	[19]
4	Specific goals must be established, and revised when met	[19, 28, 29]
5	Measurements should be easy to understand by those being evaluated	[2, 19, 27, 30, 31, 50, 57, 60]
6	Data should be collected, where possible, by those whose performance is being evaluated	[19]
7	Graphs should be the primary method of reporting performance data	[19]
8	Data should be available for constant review	[19]
9	Performance should be reported daily or weekly	[19]
10	Suppliers should be evaluated upon quality and delivery performance	[19]
11	Emphasis is upon evolving, dynamic, continuous improvement and learning	[9, 19, 21, 23, 27, 47, 57, 62]

	in PM system design	
12	The connection between accounting and performance measurement should be cut	[21]
13	PM systems should be mutually supportive and consistent with the business's goals, objectives, critical success factors, and programmes	[21]
14	Should convey information through as few and as simple a set of measures as possible	[21]
15	PM systems should reveal how effectively customers' needs and expectations are satisfied	[21]
16	Focus upon measures that customers can see	[21]
17	Provide measures that allows all members of the organisation to understand how they affect the entire business	[21]
18	System consists of well-defined and measurable criteria for the organisation	[29]
19	Routines must be established so that measures can be measured	[29]
20	Feedback from PM systems should report at numerous levels of the organisation	[32, 72]
21	Feedback from PM systems must be linked cross functionally to ensure it supports and not inhibit strategy implementation	[32]
22	Should enable managers to view performance in several areas simultaneously	[42]
23	Should provide complementary non-financial performance measures alongside financial measures	[44]
24	Should measure the entire product delivery system, from the supplier to the customer	[53]
25	PM system designed so that, at divisional level, the evaluation of PM standards is consistent with manufacturing objectives of the facility	[53]
26	PM system designed so that, at plant and divisional level, the evaluation of PM standards is consistent with the manufacturing environment	[53]
27	PM system designed so that information on the strategic objectives of the firm are shared at plant and division level to provide organisational focus between them	[53]
28	PM system information on the strategic objectives of the division must be shared across functional areas to provide organisational focus within plants and divisions	[53]
29	PM system should be used to challenge strategic assumptions	[8, 10]
30	PM system should be implemented in such a way that it does not induce fear, politics and subversion	[67]

31	PM systems should be designed so that they facilitate auditing	[7, 62]
32	PM system design should be viewed as a coordination effort to understand current metrics in detail, to identify shortcomings, and to include ongoing initiatives that affect PM	[55]

Table 2

A comparison of Performance Measurement frameworks

Framework	**Researcher**	**Framework Typology**	**Dimensions of measurement (if any)**	**Does it suggest other formal measurement processes?**
Sink and Tuttle	[73]	Procedural	-	No
Performance measurement matrix	[46]	Structural	Cost; non-cost; internal environment; external environment	No
Results and Determinants Framework	[26]	Structural	Results (financial performance; competitiveness) Determinants (quality; flexibility; resource utilisation; innovation)	No
Performance measurement system models	[53]	Structural	Cost; quality; lead time; delivery	Yes (set of analytic suggestions also provided)
Performance pyramid	[57]	Structural	Vision; market; financial; customer satisfaction; flexibility; productivity; quality; delivery; cycle time; waste	No
Ten step model	[56]	Procedural	-	No
Internal / External configuration time framework	[2]	Structural	Time	No
Kaydos' Framework	[45]	Procedural	-	No
Wisner and Fawcett's Framework	[77]	Procedural	-	No

Balanced Scorecard	[42]	Structural	Financial; internal business; customer perspective; innovation and learning	No
AMBITE Performance measurement cube	[11]	Structural	Time; cost; quality; flexibility; environment	No
Brown's Framework	[14]	Structural	Inputs; process; outputs; outcomes	No
EFQM model	EFQM	Structural	Enablers; Results	No
SME Performance Measurement Framework	[35]	Procedural	-	No
Performance Prism	[65]	Structural	Stakeholder satisfaction; strategies; processes; capabilities; stakeholder contribution	No
Framework for multi-national companies	[78]	Structural	Cross-process; cross-border; financial; consumer; internal processes; innovation; corporate culture / climate	No
Integrated Performance measurement framework	[71]	Structural	Structure; processes; input; output; outcome and potentially others	Yes (principles)

Table 3

A comparison of Performance Measurement systems

System	**Researcher**	**Specific context**	**Dimensions of measurement (structural framework)**	**Set of steps towards system design (procedural framework)**	**Specific measures**	**Other distinguishing measurement aids**	**Dynamic (i.e. can it be updated)?**
Balanced Scorecard	[42]	No	Financial; internal	Yes	No (suggestions	Yes (number of	Yes (on-going

PM system			business; customer perspective; innovation and learning		in case studies though)	performance management tools ([38-41, 43, 44])	process)
BPR PM system	[11]	Yes (BPR)	Time; cost; quality; flexibility; environment	Yes (implied)	Yes (pre-defined, non adjustable)	Yes (Process design matrix)	No (process may be repeated, but tools are static in nature)
Medori and Steeple PM system	[62]	No	Quality; cost; flexibility; time; delivery; future growth	Yes	Yes (pre-defined, non adjustable)	Yes (Auditing step)	No (process may be repeated, but tools are static in nature)

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