



Performance measurement system design: developing and testing a process-based approach

Performance measurement system design

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Abstract *Describes the development and testing of a structured methodology for the design of performance measurement systems. Frameworks, such as the balanced scorecard and the performance prism, have been proposed, but until recently little attention has been devoted to the question of how these frameworks can be populated, i.e. how managers can decide specifically which measures to adopt. Following a wide ranging review of the performance measurement literature, a framework identifying the desirable characteristics of a performance measurement system design process is developed. This framework provided guidelines which were subsequently used to inform the development of a process-based approach to performance measurement system design. The process was enhanced and refined during application in three action research projects, involving major UK automotive and aerospace companies. The revised process was then formally documented and tested through six further industrial applications. Finally the process was written up in the form of a workbook and made publicly available.*

Background and introduction

The design of performance measurement systems appropriate for modern manufacturing firms is a topic of increasing concern for both academics and practitioners (Neely, 1998). The shortcomings of existing systems, particularly those based on traditional cost accounting principles, have been widely documented (Dixon *et al.*, 1990; Hall, 1983; Johnson and Kaplan, 1987; Neely *et al.*, 1995; Skinner, 1971):

A ... major cause of companies getting into trouble with manufacturing is the tendency for many managements to accept simplistic notions in evaluating performance of their manufacturing facilities ... the general tendency in many companies to evaluate manufacturing primarily on the basis of cost and efficiency. There are many more criteria to judge performance ... (Skinner, 1971, p. 36).

As the above quote suggests, one of the key weaknesses of the performance measurement systems used by many firms is that they have traditionally adopted a narrow, or uni-dimensional, focus. Various authors, most notably

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Kaplan and Norton (1992), have argued that this problem can be overcome if a firm adopts a balanced set of measures. According to Kaplan and Norton (1992), such an approach allows managers to answer four fundamental questions:

- (1) How do we look to our shareholders (financial perspective)?
- (2) What must we excel at (internal business perspective)?
- (3) How do our customers see us (the customer perspective)?
- (4) How can we continue to improve and create value (innovation and learning perspective)?

Although such frameworks are undoubtedly valuable, their adoption is often constrained by the fact that they are simply frameworks. They suggest some areas in which measures of performance might be useful, but provide little guidance on how the appropriate measures can be identified, introduced and ultimately used to manage the business. For the balanced scorecard, or any similar performance measurement framework to be of practical value, the process of populating the framework has to be understood. The aim of this paper is to present the findings of an extended research programme, which has sought to establish, document and explain this process.

The paper begins by reviewing the business performance literature, specifically focusing on the issue of what recommendations have been made in the literature regarding the design of performance measurement systems. The information gleaned from this review is structured in the form of a set of guidelines designed to inform the development of a process for performance measurement system design. The process subsequently developed was tested during action research studies in nine different manufacturing companies. Three of these studies involved participative action research, where one of the authors acted as the process facilitator. The other six involved non-participative action research, where members of the organization's management team facilitated the process. The second section explains the rationale for, and the benefits of, this research design. Throughout the project the focus of the research was on the development and testing of a process for performance measurement system design. The third section explains how this process evolved as the project progressed through its three main phases:

- (1) initial design of the process;
- (2) testing through participative action research; and
- (3) testing through non-participative action research.

The final section discusses the implications of this research for the industrial and academic communities from two perspectives:

- (1) business performance measurement; and
- (2) research methodology.

It is argued that the research reported in this paper is valuable for several reasons. First, it is one of the only comprehensive studies to address the question of how balanced performance measurement systems can be developed. Various authors propose performance measurement frameworks, but few provide any insight into how these frameworks can be populated. Second, the research methodology adopted is unique. While the performance measurement system design process was being developed, one of the authors acted as process facilitator. In the later stages, none of the authors was directly involved in the application of the methodology. Instead members of the executive teams in the business concerned sought to apply the methodology themselves. This combination of participative action research, followed by non-participative action research, is a powerful, yet much under-utilised research method, when the aim of the research is to develop robust and practical processes for managers.

Business performance measurement – state-of-the-art

Tony Singarayar, former director of process redesign at McNeil Consumer Products, a subsidiary of Johnson and Johnson Inc., is quoted as saying:

I'm not sure which is more proprietary in a scorecard – the data it contains, or the management process that went into creating it (McWilliams, 1996).

In the authors' experience this is a common view. The process of deciding which measures of business performance to adopt is a valuable one, not least because it forces management teams to be very explicit about their performance priorities and the relationship between them, thereby exposing, and offering an opportunity to resolve, any hidden differences of opinion. Widespread interest in this topic, however, is relatively recent. Throughout the 1970s and 1980s the measures traditionally used by businesses were subject to highly vocal criticism from influential figures, such as Berliner and Brimson (1988); Hayes and Abernathy (1980); Johnson and Kaplan (1987); Kaplan (1983, 1984) and Skinner (1971). These criticisms resulted in several innovations. New methods of product costing, for example, Activity Based Costing and Through-put Accounting, were developed (Cooper and Kaplan, 1988; Galloway and Waldron, 1988a, 1988b, 1989a, 1989b). Alternative means of valuing businesses and brands, such as Shareholder Value Analysis and Brand Valuation, were proposed (Ambler and Kokkinaki, 1998; Rappaport, 1998; Stewart, 1991). Research studies, which explored explicitly the information needs of managers and investors, were undertaken (Mavrinac and Siesfeld, 1997; McKinnon and Bruns, 1992). High-level government, private and public sector enquiries, on both sides of the Atlantic, were established:

To achieve sustainable business success in the demanding world marketplace, a company must ... use relevant performance measures (UK Government White Paper on Competitiveness quoting RSA Tomorrow's Company Inquiry Report).

World-class manufacturers recognise the importance of metrics in helping to define goals and performance expectations for the organization. They adopt or develop appropriate metrics to interpret and describe quantitatively the criteria used to measure the effectiveness of the manufacturing system and its many interrelated components (Foundation of Manufacturing Committee of the National Academy of Engineering – USA).

One specific stream of writing that is particularly relevant to this paper is that concerned with performance measurement frameworks. Undoubtedly one of the most widely recognised performance measurement frameworks of today is the balanced scorecard (Kaplan and Norton, 1996). Developed by Kaplan and Norton, and popularised by the marketing efforts of major consulting companies, the phrase “balanced scorecard” appears to have entered the management vernacular. It is, however, only one of several performance measurement frameworks, which have been proposed. In 1989, for example, Keegan *et al.* presented the performance measurement matrix shown in Figure 1. As with the balanced scorecard, the strength of the performance measurement matrix lies in the way it seeks to integrate different classes of business performance – financial and non-financial, internal and external. The matrix, however, is not as well packaged as the balanced scorecard and does not make explicit the links between the different dimensions of business performance, which is arguably one of the greatest strengths of Kaplan and Norton’s balanced scorecard.

An alternative, which overcomes this criticism, is the results and determinants framework shown in Figure 2. This framework, which was developed by Fitzgerald *et al.* (1991) following their study of performance measurement in the service sector, is based on the premiss that there are two basic types of performance measure in any organization, those that relate to results (competitiveness, financial performance), and those that focus on the determinants of the results (quality, flexibility, resource utilisation and

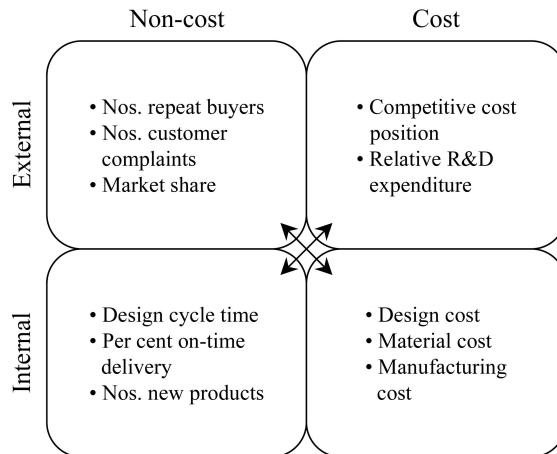


Figure 1.
The performance
measurement matrix

Source: Keegan *et al.*, 1989

Results	Financial performance
	Competitiveness
Determinants	Quality
	Flexibility
	Resource utilisation
	Innovation

Source: Fitzgerald *et al.*, 1991

Figure 2.
Results and determinants framework

innovation). The appeal of this distinction is that it highlights the fact that the results obtained are a function of past business performance with regard to specific determinants – i.e. results are lagging indicators, whereas determinants are leading indicators.

Some authors and organizations have attempted to be even more prescriptive, by proposing very detailed and specific measurement frameworks. Azzone *et al.* (1991), for example, developed the framework shown in Table I, which seeks to identify the measures most appropriate for organizations that have chosen to pursue a strategy of time-based competition.

The Institute of Chartered Accountants of Scotland (ICAS) has also developed a detailed performance measurement framework, based on the different ways in which businesses use performance measures, for:

- business planning; and
- monitoring operations.

	Internal configuration	External configuration
R&D engineering time	Number of changes in projects Delta average time between two subsequent innovations	Development time for new products
Operations through-put time	Adherence to due dates Incoming quality Distance travelled Value-added time (as a percentage of total time) Schedule attainment	Outgoing quality Manufacturing cost
Sales and marketing order processing lead time	Complexity of procedures Size of batches of information	Cycle time Bid time

Source: Azzone *et al.*, 1991

Table I.
Measures for time-based competition

To develop their frameworks, ICAS (1993) prepared a master list of all the financial and non-financial performance measures that they uncovered during a substantial review of the literature and then mapped them on to two tree-diagrams. Similarities between the ICAS frameworks and the Du Pont Powder Company's Pyramid of Financial Ratios, shown in Figure 3, can be observed. This is not surprising given that Du Pont is widely recognised as being the founder of financial performance measurement:

In 1903, three Du Pont cousins consolidated their small enterprises with many other small single-unit family firms. They then completely reorganised the American explosives industry and installed an organizational structure that incorporated the "best practice" of the day. The highly rational managers at Du Pont continued to perfect these techniques, so that by 1910 that company was employing nearly all the basic methods that are currently used in managing big business (Chandler, 1977, p. 417).

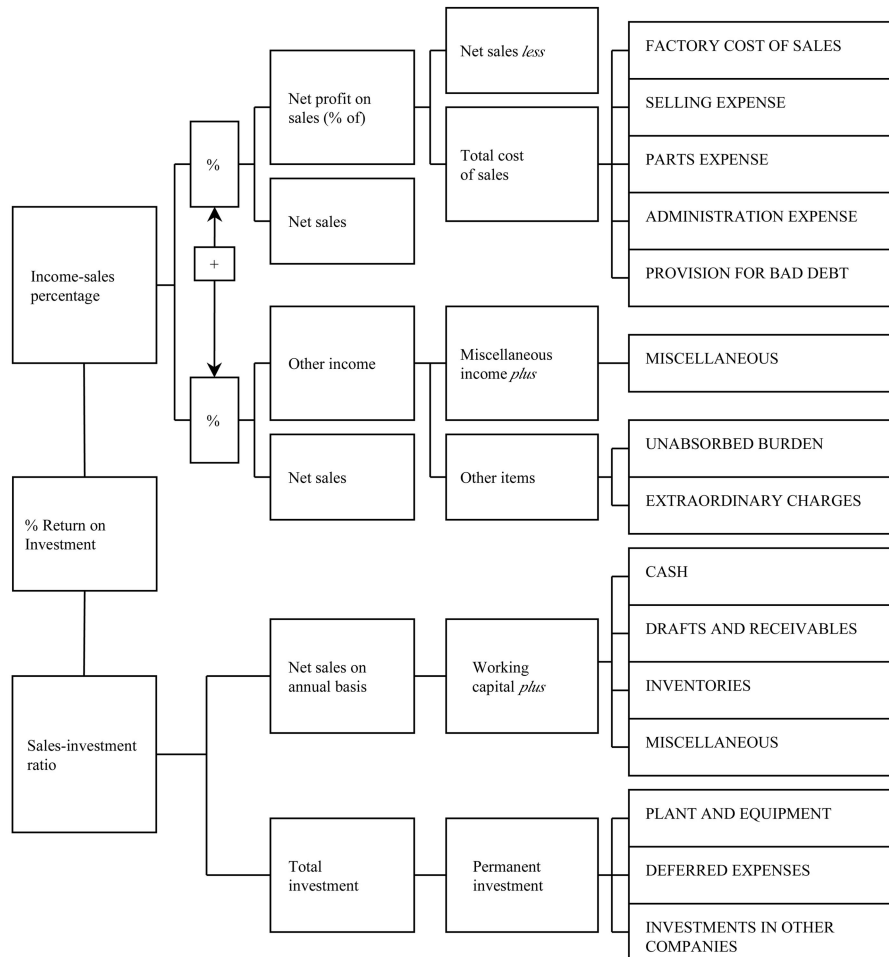


Figure 3.
Du Pont Pyramid of
Financial Ratios

Source: Chandler, 1977

The performance measurement frameworks discussed so far have tended to be hierarchical in orientation. There are, however, several frameworks, which encourage executives to pay attention to the horizontal flows of materials and information within the organization, i.e. the business processes, most notably those proposed by Brown (1996) and Lynch and Cross (1991). Brown's framework, which is shown in Figure 4, is useful because it highlights the difference between input, process, output and outcome measures. He uses the analogy of baking a cake to explain this more fully. Input measures would be concerned with volume of flour, quality of eggs, etc. Process measures would be concerned with oven temperature and length of baking time. Output measures would be concerned with the quality of the cake. Outcome measures would be concerned with the satisfaction of the cake eaters – i.e. was the cake enjoyable?

While it is conceptually appealing and undoubtedly a useful way of explaining the difference between input, process, output and outcome measures, Brown's framework falls at one extreme of a continuum stretching from hierarchical to process focused frameworks. Lynch and Cross's Performance Pyramid, shown in Figure 5, falls in the middle of this continuum. The strengths of this framework are that it ties together the hierarchical view of business performance measurement with the business process view. It also makes explicit the difference between measures that are of interest to external parties-customer satisfaction, quality and delivery, and measures that are primarily of interest within the business – productivity, cycle time and waste.

Another wide ranging and currently popular measurement framework is the European Foundation for Quality Management's Business Excellence Model. This consists of two distinct subsets of performance factors, broadly classified as enablers and results (see Figure 6). The theory underpinning the Business Excellence Model is that the enablers are the levers that management can pull to deliver future results. One of the weaknesses of this, and the Lynch and Cross framework, however, is that it is difficult to operationalise.

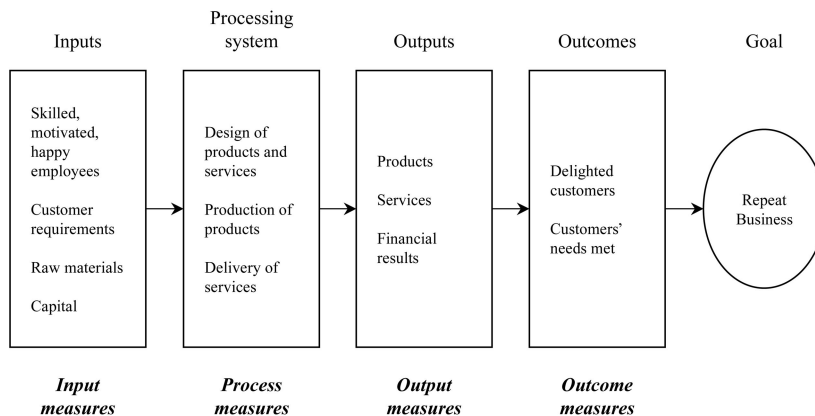
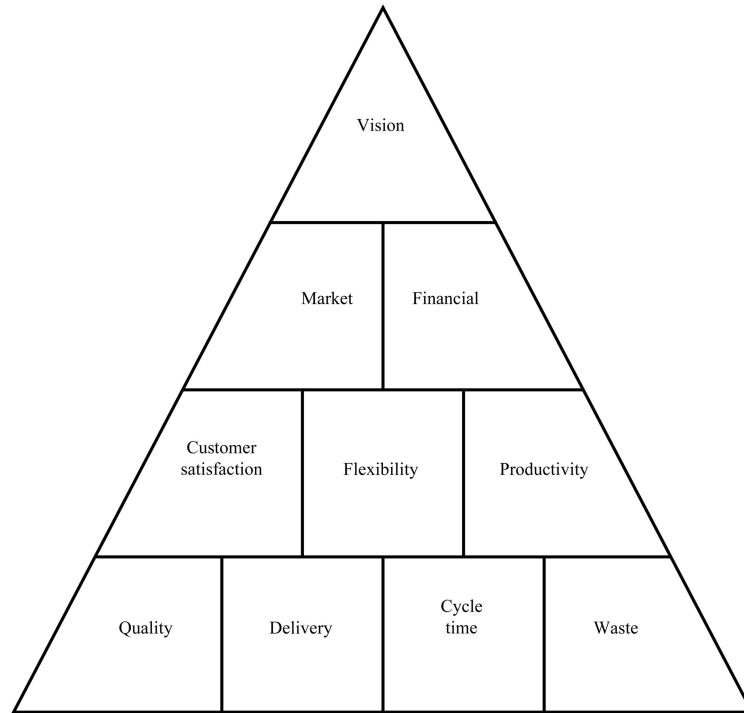


Figure 4. Inputs, processes, outputs, outcomes

Source: Brown, 1996



Source: Lynch and Cross, 1991

Figure 5.
Performance Pyramid

Business Excellence Framework

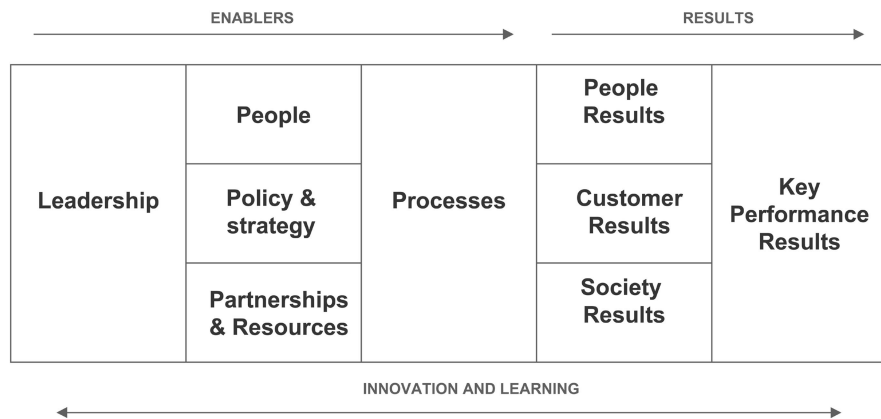


Figure 6.
The Business Excellence Model

The terms used in the framework are so open and can be interpreted in so many ways, that any single organization could decide to capture any one of several dozen different measures of performance under each of the headings. This brings us back to the problem raised earlier in this paper – namely, how can executives decide which performance measures they should rely on?

Selecting measures – advice in the literature

In the late 1980s and early 1990s the process of deciding what to measure became topical, with several authors discussing it, albeit often at a rather superficial level. Keegan *et al.* (1989), for example, argued that the process of deciding what to measure consisted of three main steps. The first involved looking to strategy – defining the strategic objectives of the company and determining how they could be translated into divisional goals and individual management actions. The second encompassed deriving an appropriate set of measures by populating a performance measurement matrix. The third focused on instilling the performance measurement system into management thinking, possibly through the budgeting process. Critical here is closing the management loop and ensuring that the measurement system actually drives day-to-day decisions and actions—thereby ensuring that the firm’s strategy is implemented.

The first and third of these steps, while difficult in practice, are relatively self-explanatory. The second – actually deciding what to measure – is, however much more involved. Keegan *et al.* (1989) suggest that the best approach is to start with five generic measures – quality, customer satisfaction, speed, product/service cost reduction, and cash flow from operations – and then simply derive the rest, ensuring that each of them is:

- integrated, both hierarchically and across the business functions; and
- based on a thorough understanding of the organization’s cost drivers.

Suggestions on how to do this in practice, however, are not offered.

In 1991 Wisner and Fawcett proposed the slightly more detailed process for performance measurement system design documented in Figure 7. This nine-step process is similar to Keegan *et al.*’s, in that it assumes that measures should be derived from strategy, but has the advantage that it makes explicit the fact that the measurement system itself should be periodically refreshed. Hence the statement:

... periodically re-evaluate the appropriateness of the established performance measurement system in view of the current competitive environment.

In their preliminary writings about the balanced scorecard, Kaplan and Norton paid little attention to the process of performance measurement system design (Kaplan and Norton, 1992). By 1993, however, they had recognised the importance of this topic and therefore included a brief description of the eight-step process they believed enabled managers to design balanced measurement systems in their 1993 *Harvard Business Review* paper “Putting the balanced scorecard to work” (see Table II).

Since then, and as the balanced scorecard has grown in popularity, there have been numerous attempts to document performance measurement system design processes, nearly all of which end up as rather open-ended and vague statements, along the lines of:

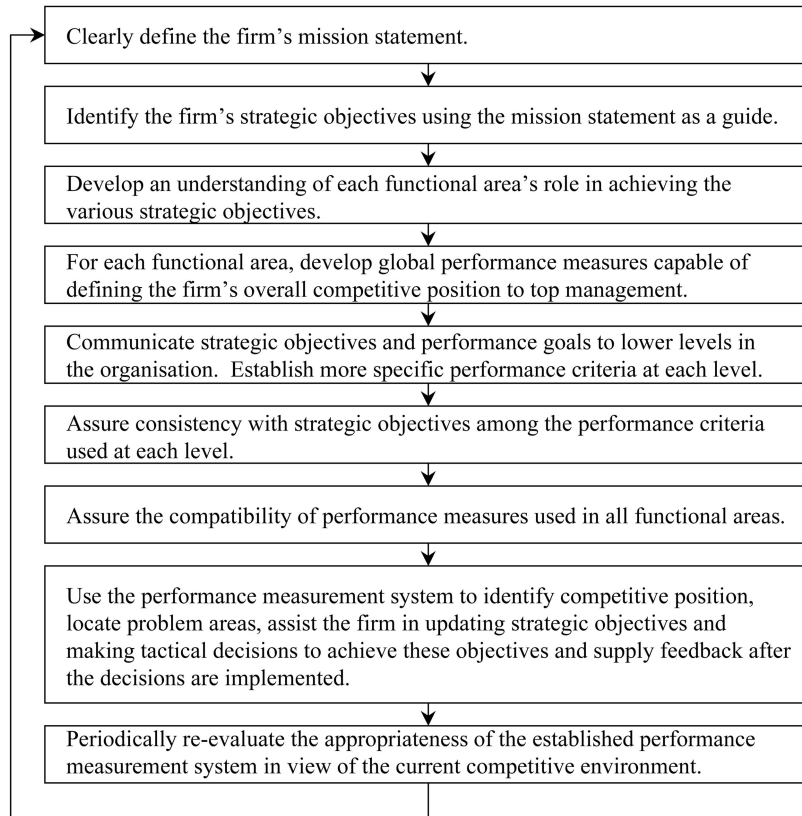


Figure 7.
Designing a
measurement system

Source: Wisner and Fawcett, 1991

However, a single hierarchy of measures cannot reflect the whole value system of the organization which combines the goals of all stakeholders. It is therefore necessary to develop a hierarchy of measurements for each group of stakeholders. Once developed, these hierarchies can be interlinked to form one comprehensive performance measurement system. These measurement hierarchies are independent of the organization structure and represent logical chains of cause-and-effect relationships concentrating on business processes rather than functions (Feurer and Chaharbaghi, 1995).

In concluding this discussion it is worth reviewing one other relevant stream of writing in the literature, namely that concerned with rules and guidelines for performance measurement system design, rather than the actual process. Authors, such as Globerson (1985) and Maskell (1989), for example, made early contributions to this literature. Globerson (1985), for example, states that:

- Performance criteria must be chosen from the company's objectives.
- Performance criteria must make possible the comparison of organizations that are in the same business.
- The purpose of each performance criterion must be clear.

1. Preparation:
Identify the business unit for which a top-level balanced scorecard is appropriate.
2. Interviews – first round:
Process facilitator interviews all the firm’s senior managers and asks them to identify the company’s strategic objectives and possible performance measures for the scorecard.
3. Executive workshop – first round:
Senior management group debate the proposed mission and strategy statements until they reach a consensus. The process facilitator then asks the senior managers to answer the following question: “If I succeed with my vision and strategy, how will my performance differ for shareholders; for customers; for internal business processes; for my ability to innovate, grow and improve?” A draft balanced scorecard is developed on the back of this.
4. Interviews – second round:
Process facilitator summarises the output from the first executive workshop and discusses it with each senior manager. The facilitator also seeks opinions about issues involved in implementation.
5. Executive workshop – second round:
Larger workshop at which the senior managers and their direct reports debate the mission and strategy statements. “The participants, working in groups, comment on the proposed measures, link the various change programmes under way to the measures, and start to develop an implementation plan”. Stretch targets are also formulated for each measure.
6. Executive workshop – third round:
“The senior executive team meets to come to a final consensus on the vision, objectives, and measurements developed in the first two workshops; to develop stretch targets for each measure on the scorecard; and to identify preliminary action programmes to achieve the targets. The team must agree on an implementation programme, including communication of the scorecard to employees, integrating the scorecard into a management philosophy, and developing an information system to support the scorecard”.
7. Implementation:
New implementation team formulates detailed implementation plan. This covers issues such as: how the measures can be linked to databases and information systems; how the scorecard can be communicated throughout the organization; and how a second level set of metrics will be developed.
8. Periodic reviews:
Each quarter or month, a book of information on the balanced scorecard measures is prepared for both top management review and discussion with managers of decentralised divisions and departments. The balanced scorecard metrics are revisited annually as part of the strategic planning, goal setting, and resource allocation processes.

Source: Kaplan and Norton, 1993

Table II.
Designing a balanced
scorecard

- Data collection and methods of calculating the performance criterion must be clearly defined.
- Ratio based performance criteria are preferred to absolute numbers.
- Performance criteria should be under the control of the evaluated organizational unit.

- Performance criteria should be selected through discussions with the people involved (customers, employees, managers).
- Objective performance criteria are preferable to subjective ones.

Similarly Maskell (1989) offers the following seven principles of performance measurement system design:

- (1) The measures should be directly related to the firm's manufacturing strategy.
- (2) Non-financial measures should be adopted.
- (3) It should be recognised that measures vary between locations – one measure is not suitable for all departments or sites.
- (4) It should be acknowledged that measures change as circumstances do.
- (5) The measures should be simple and easy to use.
- (6) The measures should provide fast feedback.
- (7) The measures should be designed so that they stimulate continuous improvement rather than simply monitor.

The performance measurement system design principles proposed by Globerson (1985) and Maskell (1989) can be categorised according to whether they relate to the process of designing a performance measurement system, or whether they focus on the output of the process. Take, for example, Globerson's (1985) assertion that "the performance criteria should be chosen from the company's objectives". This is equivalent to Maskell's (1989) recommendation that "the measures should be directly related to the firm's manufacturing strategy", and in both cases the performance measurement system design principle being examined relates to the process of designing a performance measurement system – look to strategy first – rather than the actual output of the process. Table III categorises each of the previously identified performance measurement system design principles along these dimensions. This provides a framework that can be used not only to appraise the performance measurement system design processes proposed by various authors (Keegan *et al.*, 1989; Wisner and Fawcett, 1991; Azzone *et al.*, 1991 and Kaplan and Norton, 1993), but also to inform the design of such a process.

Research question and methodology

The literature review presented in the previous section highlights the fact that despite widespread interest in the topic of performance measurement little detailed attention has been paid to the question of how managers can decide which performance measures they should adopt. Indeed even those authors that have discussed this issue have tended to offer superficial and rather generic guidelines as opposed to specific and actionable advice. As a result the authors of the present paper set out to address the following research questions:

Desirable characteristics of a performance measurement system design process	Desirable characteristics of the output of the process
Performance measures should be derived from the company's strategy.	Performance measures should enable/facilitate benchmarking.
The purpose of each performance measure must be made explicit.	Ratio based performance measures are preferable to absolute numbers.
Data collection and methods of calculating the level of performance must be made clear.	Performance criteria should be directly under the control of the evaluated organizational unit.
Everyone (customers, employees and managers) should be involved in the selection of the measures.	Objective performance criteria are preferable to subjective ones.
The performance measures that are selected should take account of the organization.	Non-financial measures should be adopted.
The process should be easily revisitable – measures should change as circumstances change.	Performance measures should be simple and easy to use.
	Performance measures should provide fast feedback.
	Performance measures should stimulate continuous improvement rather than just monitor.

Table III.
Desirable characteristics of a performance measurement system design process

- (1) can a detailed process for performance measurement system design be specified and, if so;
- (2) what would that process involve?

Addressing these questions involved the authors in six phases of research. The first – process design – required the authors to specify a process for performance measurement system design. The second – process development – involved enhancing this process through participatory action research studies in three UK manufacturing business units. The third – process documentation – involved documenting the revised process in workbook form so that other people could apply it. The fourth – process testing – involved testing the process in workbook form through non-participatory action research in a further six UK manufacturing business units. The fifth – process publication – involved publication of the revised workbook. The sixth – process acceptance – involved a survey of workbook purchasers to assess the level of process take-up.

The rationale for these different stages is as follows. During the first two phases – process design and process development – the stability of the

process is likely to be low. The initial version of process is based upon academic theory and observed industrial practice, but has yet to be applied. During the early applications it is likely that many shortcomings of the process will be identified, either by members of the management team or by the process facilitator. Hence it is essential that the individual responsible for specifying and enhancing the process is intimately involved in the first few applications. Thus the adoption of participatory action research, with the researcher acting as process facilitator, during the process development phase.

Once the process has been used in several cases it becomes possible to document it in the form of a workbook, which presents sufficient detail to allow other people to apply it. A critical question to address at this stage is – can others actually apply the documented version of the process? That is, does the workbook contain all of the information necessary to apply the process, or is there some further knowledge – either tacit or explicit – which has not been incorporated into the workbook and without which the process cannot be applied? Hence in the process testing phase it is essential that people other than the original developer of the process apply it, to enable an assessment to be carried out of whether the documented process provides sufficient detail to allow application.

Once it has been demonstrated that the process can be applied by a variety of people, then process publication becomes appropriate and ultimately process acceptance can be assessed, ideally through a survey of workbook purchasers. In the remainder of this section further detail on each of these phases is provided. Key questions addressed include – what were the aims of the phase, how was the work carried out, and what were the lessons learned?

Process design

The performance measurement system design principles summarised in Table III were used to construct a pilot process for performance measurement system design in late 1992. This process consisted of the 12 phases outlined below:

Phase 1: What measures are required?

- Purpose: To identify what information each manager needs to manage his part of the business.
- Procedure: Brainstorming session.
- Output: List of possible areas for performance measurement.

Phase 2: Cost-benefit analysis

- Purpose: To ensure that high pay-off measures are identified.
- Procedure: Plot output from phase 1 on to cost-benefit matrix.
- Output: List of high pay-off areas for performance measurement.

Phase 3: Purpose for measurement

- Purpose: To ensure that there is a clear purpose underlying each measure.
- Procedure: Complete purpose for measurement check sheet.
- Output: List of core areas for performance measurement (i.e. ones that are both high pay-off and fundamental).

Phase 4: Comprehensiveness check

- Purpose: To check that all the important areas for measurement have been covered.
- Procedure: Brainstorming session with prompts from a facilitator.
- Output: List of extra areas for performance measurement – these should still be either high pay-off or fundamental.

Phase 5: Detailed design (function)

- Purpose: To determine the structure for each performance measure.
- Procedure: Completion of performance measurement record sheets with the assistance of a facilitator.
- Output: Series of record sheets, each of which summarises the key issues associated with a given manager's performance measures.

Phase 6: Integration (function)

- Purpose: To determine whether the performance measures identified can be integrated.
- Procedure: Completion of integration assessment check sheets.
- Output: An integrated set of performance measures for a given business.

Phase 7: Environmental considerations (function)

- Purpose: To check whether each of the key performance measures is appropriate for the function's current environment.
- Procedure: Completion of performance measurement environmental audit with the assistance of a facilitator.
- Output: Set of appropriate and comprehensive performance measures for a given manager.

Phase 8: Inter-functional testing

- Purpose: To determine whether the performance measures identified by different managers can be integrated.
- Procedure: Group meeting and completion of integration assessment check sheets.

- Output: An integrated set of performance measures for a given business.

Phase 9: Environmental considerations (inter-functional)

- Purpose: To check whether all the measures are appropriate for the organization's current environment.
- Procedure: Completion of performance measurement environmental audit with the assistance of a facilitator.
- Output: Complete set of appropriate performance measures.

Phase 10: Destructive testing (inter-functional)

- Purpose: To determine how the numbers can be played to maximise apparent rather than actual performance.
- Procedure: Group meeting and completion of destructive testing check sheets.
- Output: Enhanced integrated set of performance measures (with potential problem areas highlighted).

Phase 11: Institutionalisation

- Purpose: To institutionalise the performance measurement system.
- Procedure: Introduction and training regarding the new measurement system. Regular audits to establish whether there is an informal and conflicting performance measurement system in operation.
- Output: An implemented integrated set of performance measures.

Phase 12: Ongoing maintenance

- Purpose: To ensure that redundant measures are deleted and new ones introduced as appropriate.
- Procedure: Ongoing completion of performance measurement review check sheet.
- Output: A systematic process for ensuring that the performance measures are regularly updated not only by a given manager, but also by the management group.

The process was deliberately designed as one that had to be facilitated. As can be seen from the process outline provided above, guidelines covering both who should be involved and what procedure should be adopted during each phase of the process were developed in advance. Specific check sheets to enable the necessary data to be captured, such as the performance measure record sheet (see Neely *et al.*, 1997 for further details), were also developed. The aim of the process design phase, then, was to establish a practical performance measurement system design process, building on the best of academic theory and industrial practice, which could subsequently be tested through live application.

Process development

Between June 1993 and October 1994 the pilot performance measurement system design process was applied in three UK manufacturing companies – two automotive and one aerospace. The automotive companies, with sales turnovers of £24 million and £22 million, employed in the region of 350 people each and manufactured disk brake pads and gaskets respectively. In the case of the aerospace company, the process was applied to a service function within the business employing some 800 people. The general format of each process application was identical. One of the authors of this paper acted as process facilitator and guided the management team of the business through the steps outlined previously. The fact that the process was under development was made explicit to the management team at the outset of each process application and all members of the team were continually encouraged to comment on the strengths and weaknesses of the process as the project progressed. The process facilitator also regularly reflected and critiqued the process and its application, recording observations and comments in a participant's diary.

In each case, by following the proposed process, the management team were able to identify and specify an agreed set of balanced performance measures that they could subsequently use to manage the business. During the three applications, however, the process was subject to considerable evolution and enhancement, as described below.

Application 1: manufacturer of disk brake pads

The first application of the process lasted from June 1993 through to October 1993. During this period, two of the authors of this paper spent approximately one day per week working with the management team of the business unit concerned as they sought to develop their performance measurement system. At the outset, the 12-phase process outlined previously was explained to the management team, who accepted it and agreed to follow it. By the end of phase 5 – detailed design – it had become apparent that the 12-phase process would have to be modified as the management team had already identified some 50 key performance indicators for the business, despite the fact that the process was supposed to assist them identify the “vital few” (Lynch and Cross, 1991). When reviewing the specific phases of the process in more detail it became apparent that phases 1 and 5 had worked as intended, but phases 2, 3 and 4 were flawed.

Phase 1 – the initial brainstorm – worked well, with the managers identifying the 30 indicators that they felt were the most important to the business. Phases 2 and 3 were supposed to help the managers rationalise this set of indicators by encouraging them to think about the costs and benefits of specific measures and the rationale for introducing them. In reality, neither of these phases had the desired effect. When asked to comment on the costs and benefits of specific measures, the response of the managers concerned appeared to be a function of whether or not the measure being discussed already existed in the organization. In those cases where the measure existed the managers would generally argue

that the costs associated with the measure were low (because the infrastructure for collecting and compiling the data had already been established) and that the value of the measure must be reasonably high; otherwise the measure would never have been introduced in the first place. When it came to measures not already in existence, however, the argument most commonly put forth was that the costs of establishing the infrastructure to enable the necessary data to be captured and analysed would be high, while the value of the measure was uncertain because it did not already exist. The net impact of these views was that all of the measures that currently existed were deemed worth keeping, while the cost-benefit of new measures could not be assessed. Hence none of the 30 critical indicators identified during the initial brainstorming session was discarded because of its cost-benefit implications.

The outcome of phase 3 was similar. In theory asking the managers why they wanted specific measures was supposed to force them to reflect on the purpose of each measure, thereby enabling them to identify which really were critical and which could be deemed unnecessary. In practice all of the managers involved in the process were able to specify reasons why each measure was necessary. Hence, rather than resulting in a reduced set of measures, phases 2 and 3 actually resulted in the managers involved in the process becoming more convinced that the 30 measures that they had originally identified as critical were indeed critical. The fourth phase made the situation even more complicated because here the comprehensiveness of the proposed set of measures was checked against the four perspectives proposed by Kaplan and Norton in their writings about the balanced scorecard. When the 30 measures were checked against the balanced scorecard it became apparent that most of them were financial and operational in nature, while only a few related to the customer perspective and none related to the innovation and learning perspective. Hence the management team started to identify further measures that they thought should be developed, with the ultimate result that they had 50 measures they believed were critical for the business. It was only when they entered into phase 5 of the process and began specifying the measures in detail that they recognised the complexity of the measurement system they were proposing and hence began to scale back their ambitions.

In line with these experiences it was decided that the process should be simplified and that the first phase should be structured so that it encouraged the management team to identify a limited set of strategically important measures, rather than offering them an opportunity to have a rather open and unstructured brainstorm. A revised process, which consisted of six main phases was then developed and documented in the form of a process flowchart (see Figure 8). It was this process that was used in the second case study.

Application 2: manufacturer of gaskets

The second application of the process lasted from November 1993 until April 1994. During this application one of the authors of this paper acted as process facilitator, and was supported in this role by a member of the senior

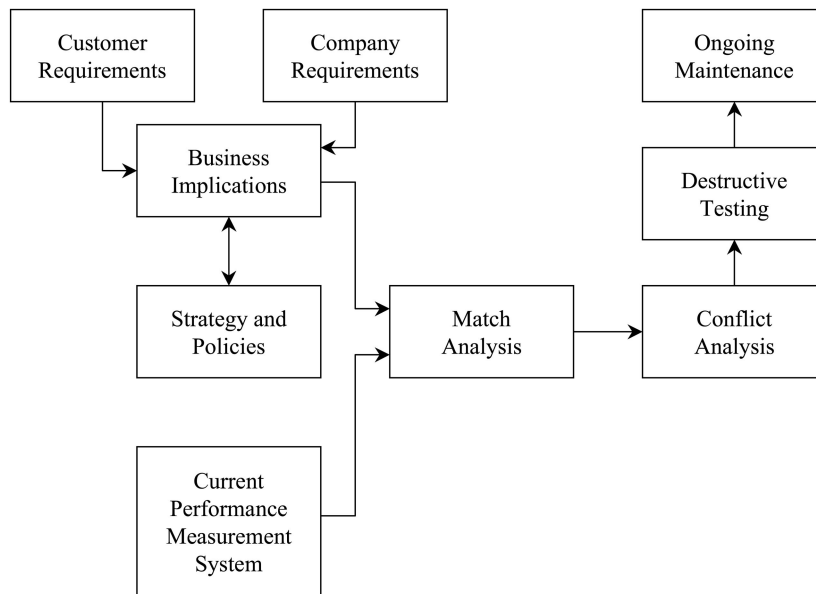


Figure 8. Modified performance measurement system design process

management team of the business concerned. The advantages of this were twofold. First it ensured that specific process facilitation knowledge was transferred from the University to the company concerned. Second the benefits of having external and internal facilitators were achieved. The external facilitator found it easy to offer unbiased advice, while the internal facilitator was very sensitive to the organization's culture and the expectations of the senior management team. During the course of the process application one significant modification was made to the process shown in Figure 9, namely the addition of a specific activity designed to identify and assess the measures that currently existed in the organization (see Neely *et al.*, 1994 for further details).

Application 3: service function within an aerospace company

Following the second application the process flowchart was again revised (see Figure 9) and a final application was arranged. This lasted from April 1994 until October 1994. Once again the process was facilitated by one of the authors of this paper supported by a member of the organization's senior management team. The flow of the process, as described in Figure 9, remained unchanged as a result of this application. Indeed the only changes that were identified as necessary were minor changes to the wording of the draft workbook, which by now had been produced.

Process documentation and testing

Upon completion of the process development phase of this research a stable process for performance measurement system design of the format shown in Figure 9 had been developed and a draft workbook produced. Following further

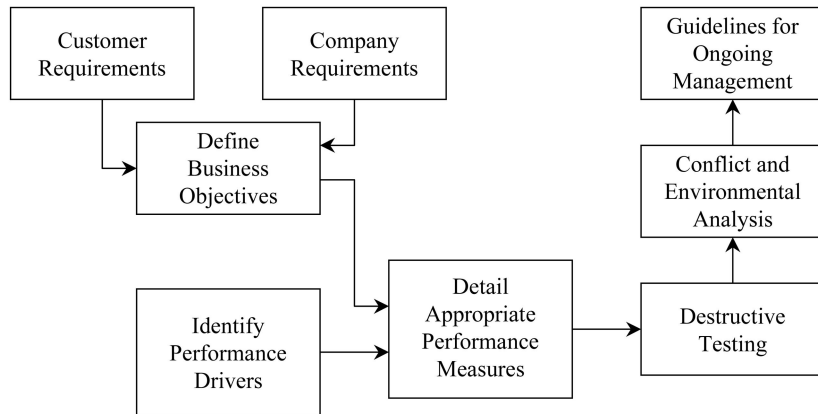


Figure 9.
Process flowchart
following third
application

development of, and revisions to, the workbook, a version was produced which was ready for more formal testing. To enable this testing to take place the authors established an SME (small and medium sized enterprise) club. Two companies were invited to participate in the pilot club – a manufacturer of writing instruments and a manufacturer of constant tension springs. The managing directors of both of these organizations nominated a member of their own senior management team to act as process facilitator. The nominated individuals were given a two-day training course in the process by members of the research team and then invited to apply the process, as described in the workbook, to their own organizations. The rationale for this non-participatory action research strategy was that it enabled the transferability of the performance measurement system design process, as described in the workbook, to be assessed. That is, it allowed the researchers to establish whether the process as described in the workbook could be applied by someone other than the developer and author of the process. The company facilitators were asked to follow the process as outlined in the workbook as closely as they could, but were offered the support of the research team if they needed it at any stage (provided that they explained why they needed this support, as this would enable the researchers to establish which aspects of the process were either not easily transferable or alternatively not well explained in the workbook).

In the event the internal facilitators in both organizations required considerable support from the research team. During the course of interviews and discussions with managers in both organizations and the facilitators themselves it became apparent that the primary reason these interventions were required was because the authors had built too many barriers to entry into the process as described in the workbook. During the course of earlier process applications the authors had encountered many situations which they felt were important to explain to potential facilitators. The majority of these involved specific situations or challenges that the authors had faced when applying the process and the anecdotes included in the workbook therefore

covered a description of both the situation and an explanation of how the authors had handled it. As far as the authors were concerned these were formative experiences in their learning and hence important to communicate to new process facilitators. As far as the new facilitators were concerned these formative experiences were context specific and irrelevant to the process. Hence they found them to be barriers which detracted from the otherwise logical flow of the process. As a direct result the authors undertook to significantly revise the workbook. Instead of seeking to describe the process in exhaustive detail they decided to focus primarily on the flow of the process and describe in detail only the tools and techniques that the facilitator would employ at each stage. During this stage the authors produced the detailed map, shown in Figure 10, which illustrates the essential phases in the process.

Once the detailed map of the process had been agreed the authors re-wrote the process and in doing so cut out all of the superfluous detail. The style that was adopted in the revised process was far more prescriptive, with each section including specific guidance for the process facilitator under the four general headings: aim, why, how, and tips. Figure 11 provides an extract, which illustrates the revised format of the workbook.

The revised workbook was tested through the medium of a second SME club. This time four organizations were invited to participate in the study. Once again the authors provided a two-day training course for the in-company facilitators and then the facilitators were invited to apply the process in their own organizations. In this phase the facilitators were able not only to engage with the process, but also to identify ways in which it could be improved. Interestingly these improvements were not limited simply to the content and layout of the workbook, as some of the facilitators were also able to develop alternative ways of handling parts of the process. One facilitator, for example, developed a new way of visualising the relationship between measures as he felt it was particularly important for members of his team to understand the links between the measures they were discussing. Such suggestions

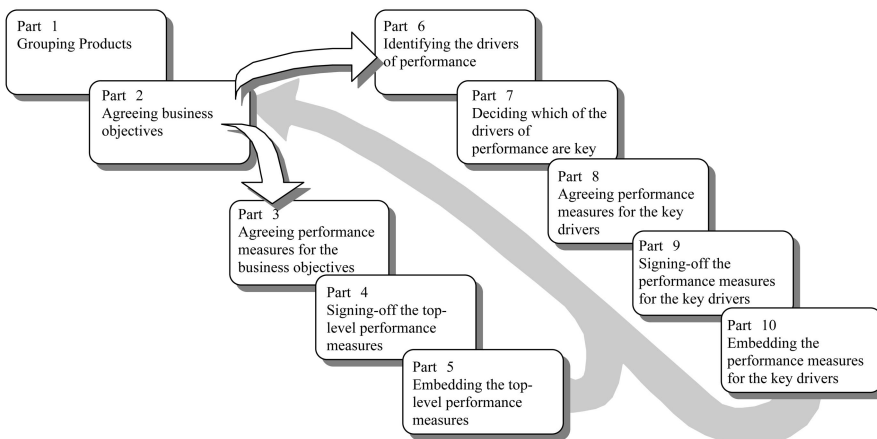


Figure 10.
The process as it appears in the workbook

Part 2. What are our business objectives?

Aim Agree targets, check against business strategy

How

Tips

Use photocopies of the stationery sheet on the next page

Product Group:

Objectives		Target		Responsibilities and Contributions					Check/Develop measure
Description	Priority	Improvement	By When?						

Figure 11.
Extract from the
workbook

highlighted two issues for the authors. First they provided tangible evidence that the process was now described in a form that was accessible to potential users. Second, they suggested that some people would use the workbook to inform them as they sought to develop a performance measurement system design process tailored to their own organization.

Process publication and acceptance

On completion of the second SME club a publisher was approached and an agreement was made to publish the workbook (Neely *et al.*, 1996). The workbook was published in June 1996 and by July 1997 some 570 copies had been sold to 520 different companies. In early 1998 these 520 workbook purchasers were surveyed to establish the level of process take-up. Usable replies were received from 101 companies. Of these, 28 per cent reported that they had followed the process in whole or part, while 71 per cent said that they found the book useful and less than 5 per cent reported that they did not find the book useful.

It is worth noting that the reasons why people purchased the book varied considerably, with by far the most popular being “to raise the general awareness of performance measurement” (54 per cent of respondents). The second most popular reason, “use the process in outline for performance measurement system design” was cited by 16 per cent of respondents. This is interesting, especially as the workbook was deliberately designed to be used, rather than simply raise awareness. Hence there appears to be a pent-up, and as yet unsatisfied, demand for general information about the measurement of performance. Even more importantly, some of those who purchased the book primarily to raise awareness must have ended up using it to improve their measurement systems, as this is the only way of accounting for the difference between those who said they purchased the workbook because they wanted to use it (22 per cent of respondents) and those purchased the workbook and subsequently followed all or part of the process (28 per cent of respondents).

A question that remains is what about the 72 per cent of respondents that purchased the workbook, but did not use it. The majority of them derived value from the workbook, evidenced by the fact that 71 per cent of respondents reported that they found the book useful. Interestingly 91 per cent of respondents reported that they had at least some need to reassess their measurement systems at the time they purchased the workbook. The data suggest then that there is a pent-up need for organizations to reassess their measurement systems, that managers found the workbook useful, but that managers still did not complete the review of their management systems. Open questions were used to explore why this was the case, and by far the most common reasons cited were lack of time and other business pressures. The sub-text to many of these comments, however, appears to be that managers are still looking for off-the-shelf solutions which require little time and effort to develop. All those who are writing about measurement argue that measures should be company specific and derived from strategy. Managers who have been through the process of deciding what to measure recognise the enormous value in the learning and consensus building that ensue. Yet still there is a pent-up demand for off-the-shelf measurement systems. It is as if managers know that it is good for them to reflect deeply about their business, its strategies and measurement systems, yet the day-to-day pressures of their jobs prevent them from doing this, and so they are forced to fall back on simple pre-packaged solutions.

Discussion and conclusions

The research reported in this paper has several features that are unique. First the work has implications for the field of business performance measurement. To date various performance measurement frameworks and methods of analysing the appropriateness of the measurement systems that exist in specific organizations have been proposed (Bititci and Carrie, 1998; Dixon *et al.*, 1990; Kaplan and Norton, 1996). Little work, however, has been completed on the process of actually designing measurement systems. Furthermore, in undertaking both participatory and non-participatory action research projects

which sought to result in the design of measurement systems, it became apparent that much of the writing about performance measurement to date has been too superficial, in that it ignores the complexity involved in the actual design of measurement systems.

The second unique feature of the research reported in this paper is the research methodology adopted. The authors have been fortunate in that their research has been funded for an extended period of time. This has enabled them to adopt a methodology which allowed them to design a process, develop it through participative action research, document it, test it through non-participative action research, publish it and assess process take-up through a survey. This extended research programme, with its multiple phases, has proved an extremely successful method of developing a robust and exploitable performance measurement system design process.

The question that remains is what next? In the authors' opinion there is a very pressing answer to this question – implementation. The process of designing a measurement system is intellectually challenging, fulfilling and immensely valuable to those managers who participate fully in it. There is increasing anecdotal evidence, however, that the process of designing the measurement system is not the most difficult task. The real challenges for managers come once they have developed their robust measurement system, for then they must implement the measures. As soon as they seek to do so they encounter fear, politics and subversion. Individuals begin to worry that the measures might expose their shortcomings. Different people seek to undermine the credibility of the measures in different ways. Some seek to game the system. Others seek to prevent it ever being implemented. Research into these issues, and particularly how they can be addressed, is much needed. Once these questions have been answered then the challenge lies in how the measures can be used to manage the business – i.e. what is the role of measurement and how can the measurement system itself be managed? – i.e. how can managers ensure that the measures they use maintain their relevance as time passes? This is a full and challenging research agenda, and it is also a vital one. Numerous managers are currently re-engineering the measurement systems their organizations are using. Few have any systematic process for doing so. Even fewer appear to be actively considering the issues associated with the implementation use, and ongoing maintenance of the measurement systems they are currently designing. Far too often measurement system implementations fail. When they succeed, organizations often find themselves short of people who have the skills required to analyse and interpret the data. Over time, their measurement systems become less and less valuable, as they become more and more complex. New measures are added, but obsolete measures are rarely deleted. Hence the importance of research into these four interlinked themes of measurement system design, implementation, use and ongoing management, and the people, processes, infrastructure and culture issues associated with them (see Figure 12).

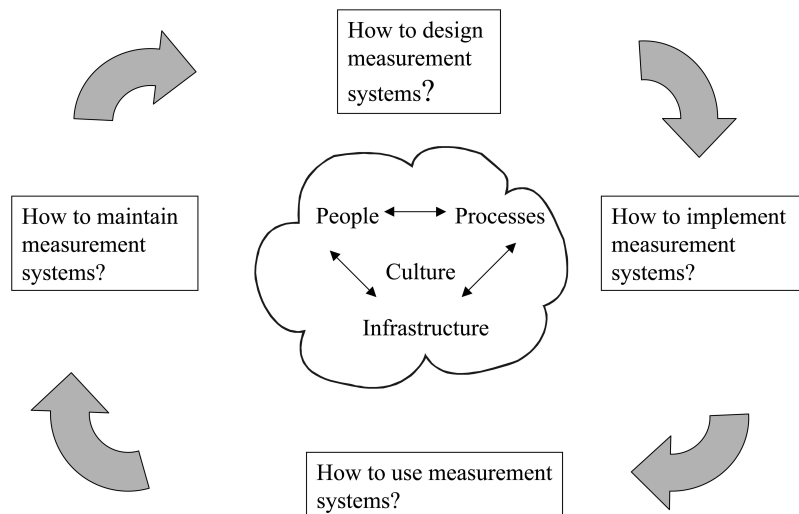


Figure 12.
Measuring business
performance: emerging
research themes

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