

Cranfield University

Andrey Pavlov

Measuring Organisational Routines: A Systematic Review

School of Management

Master of Research

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Andrey Pavlov

Measuring Organisational Routines: A Systematic Review

Supervisor: Dr Michael Bourne

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Abstract

This dissertation employs the systematic review method to review the literature informing the question of using performance measurement to drive strategy execution. The narrative review outlines the location of this issue within the relevant domains of literature and is used to formulate the questions for the systematic review. The latter are formulated to reflect two major approaches to using measurement for strategic management purposes – measuring to challenge strategic assumptions and inform subsequent intervention and measuring to drive localised strategic learning. Learning is conceptualised as continuous change in organisational routines, where the latter provide a “window” to the firm’s strategy by the virtue of being the constituent parts of dynamic capabilities.

The systematic review follows the structure suggested by Cranfield School of Management and outlines the sequence of actions taken during the review process. It provides a record of the decisions taken and outside input received during the process.

The evidence found through the systematic review leads to several conclusions. First, the inadequate level of research into the measures of routines precludes measurement from being used for evaluating routines to inform subsequent intervention. Measures of routines need to be systematised, better understood and better operationalised before this application of measurement becomes possible as an independent strategic management approach. A first step in this direction is offered by proposing a classification of measures of organisational routines.

Understanding changes in routines as learning that can be influenced by performance measurement offers a greater potential. It is suggested that while learning is stimulated by performance feedback and takes place through routines, it can be influenced strategically through the use the feedforward function of measurement.

The results of the findings from the systematic review are integrated into a coherent framework, on the basis of which several avenues for further research are suggested.

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1 Introduction

1.1 Overview

This dissertation presents a systematic review of literature aimed at discovering the ways in which performance measurement is used for driving strategy execution through organizational routines. The method employed in the dissertation – the systematic review – is a method of gathering, selecting and analysing evidence that aims to be transparent and reproducible, thus increasing the rigour of the review process.

This dissertation in general and the systematic review in particular are the first step towards a full-scale doctoral research project. Therefore, the aim of the dissertation is not only to review and synthesise the available evidence, but also to sketch the possible directions for subsequent doctoral research.

The systematic review works best when the review question is sharp and focused, and the degree to which arriving at such a question is possible is often influenced by the nature of the field. The research issue mentioned above lies at the intersection of three major fields of management knowledge – organisation theory, performance management, and strategy. It is clear that a complete review of these fields is impractical and hardly plausible. Therefore, in this dissertation, the literature in these fields was used as a general context which informed the framing of the review questions and the design of the review.

1.2 The Context of the Systematic Review

The focus of this dissertation lies in the area of using performance measurement to guide the process of strategy execution. Performance measurement has evolved to become a strategic management instrument (Simons, 1995; Kaplan and Norton, 1996a, 1996c; Neely, 1998). The question that drives the inquiry here is the way in which performance measurement can be used to drive the process of executing a firm's strategy and the mechanisms that allow it to be an instrument of strategic management.

The argument that underpins the overall research area and serves as a basis for designing the systematic review suggests that the role of performance measurement in strategy execution can be understood best by examining it through the prism of organisational routines. Briefly stated, the idea is that by providing the appropriate information about performance, performance measurement can drive the process of strategic learning by inducing changes in organisational routines. When the latter are viewed as building blocks of the firm’s dynamic capabilities, performance measurement becomes an instrument for leading strategy execution through managing dynamic capabilities.

As it was mentioned earlier, this issue lies at the intersection of three fields of management knowledge: performance measurement, strategy, and organisation theory (see Figure 1). In order to understand their contribution, it is necessary to examine their respective literature domains from the viewpoint of the research question. An important qualification needs to be introduced at this point – given the focus and the limitations of this study, an exhaustive review of literature in these areas is not only undesirable, but also by no means possible. Rather, the key themes within each field will be reviewed to the extent that they inform the area of interest stated above and contribute to the formation of the focused review question and the design of the systematic review.

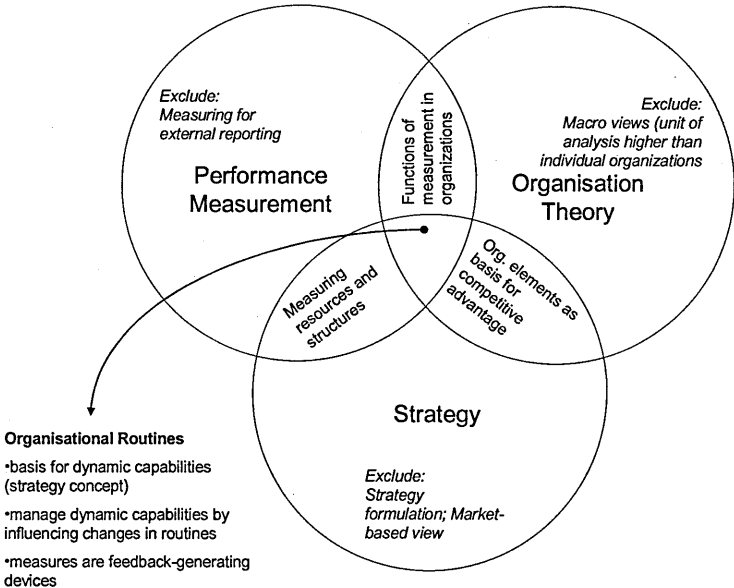


Figure 1. A Venn diagram of the literature domains

1.3 The Structure of the Dissertation

This dissertation builds on the scoping study (the narrative review of relevant literature domains) conducted by the author. Chapter 2 of the dissertation presents a shorter version of the scoping study, whose aim is to sketch the landscape of the relevant bodies of academic literature and use their respective arguments to position the research issue, arrive at the appropriate review question, and inform the design of the systematic review.

Chapter 3 outlines the method used for conducting the literature review and provides a clear record of the decisions taken during the review process.

Chapter 4 presents the findings of the review. Descriptive findings, which include various data about the reviewed studies, and thematic findings, which present the major ideas and arguments encountered in the studies, are reported separately.

Chapter 5 is the discussion of the findings, which aims to draw a coherent picture of the reviewed fields and provide the answer to the review question by synthesising the evidence into an integrative framework.

Chapter 6 concludes the dissertation with a review of the major findings and their limitations, a brief discussion of the learning points, and a list of implications for further research.

2 Positioning the Inquiry: The Narrative Review

2.1 Overview

This chapter presents a narrative review of the literature domains that inform the research area of interest. These domains belong to three fields: performance measurement, strategy, and organisation theory. The relevant themes and debates in these fields are reviewed in order to position the overall research area of interest and arrive at the appropriate systematic review question and design.

It is worth repeating that, given the limitation of this work, an exhaustive review of these fields is impossible, and, given its purpose, unnecessary. What follows, therefore, is a discussion of the ways in which the themes inform the area of interest and help to arrive at the review question. A graphic representation of this structure is presented in Figure 2.

The chapter concludes with the positioning of the inquiry in the aforementioned domains of literature and the identification of the review question for the systematic review.

2.2 Performance Measurement

Performance measurement (PM) is a diverse field, where academic research is fuelled by contributions of different management disciplines and complemented by the work of practitioners. In a recent review of the field, Marr and Schiuma (2003) list accounting, economics, psychology, and sociology among the disciplines that inform the debate in the field. As such, PM has many roots and a rich history. Two of these roots are particularly relevant to the focus of this dissertation: accounting – as a direct predecessor of PM (Franco-Santos and Bourne, 2005) – and management control systems (MCS) – due to its link with strategy.

2.2.1 The precursors of performance measurement

The major advances in the field of accounting were accomplished by the early 1900s (Kaplan, 1984). It was argued that since then, accounting has not kept pace with

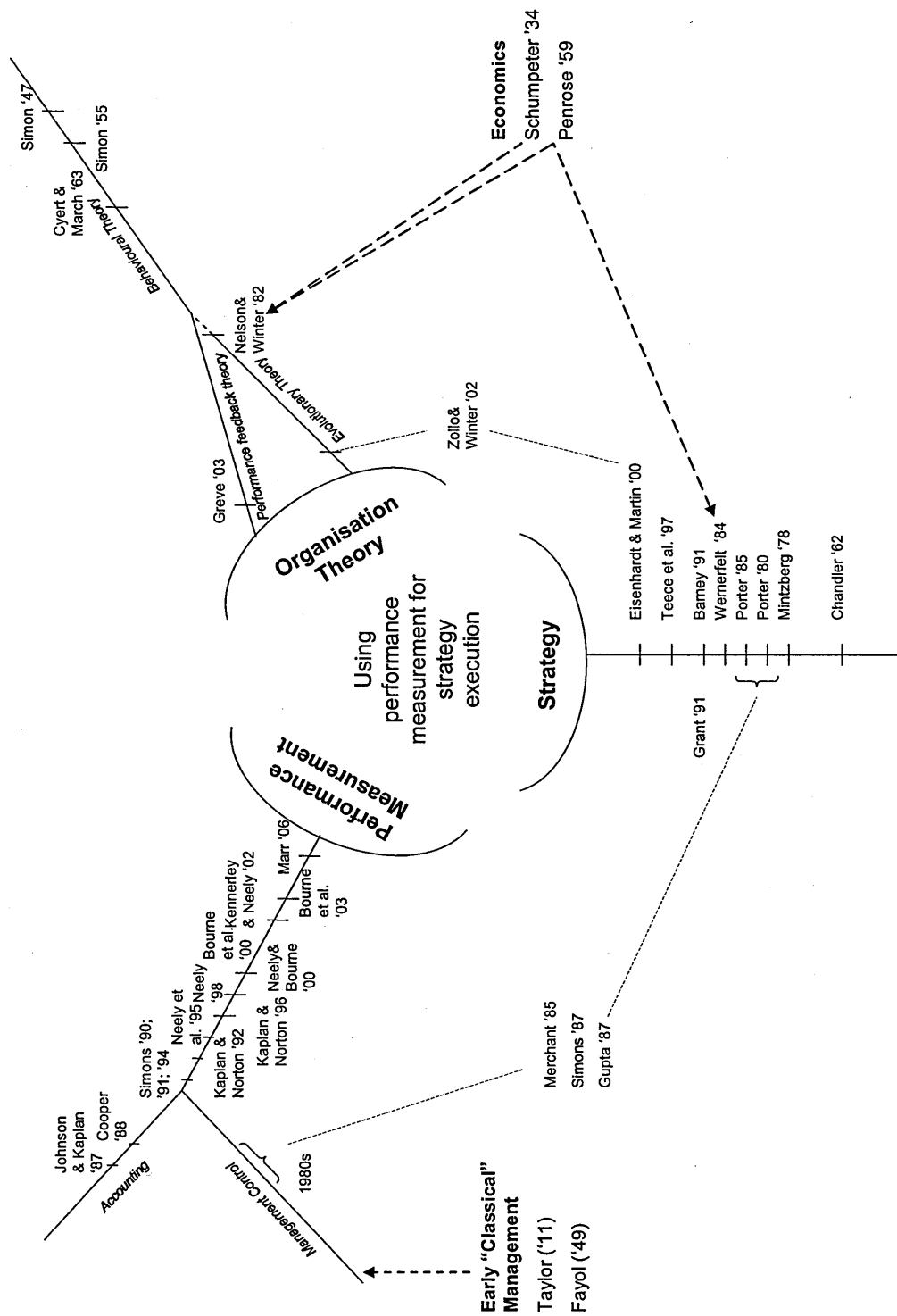


Figure 2. Literature informing the question.

changes in the business environment and by the end of the century was more of an impediment than an enabler of effective management (Johnson and Kaplan, 1987). New accounting methods, such as activity-based costing (ABC) appeared in the 1980s and received some success. However, it was later argued that this success was not so much a result of a new and better paradigm of measurement, but an indication of the fact that ABC delivered its benefits indirectly – by forcing managers to analyse business processes or, in other words, challenge the assumptions underlying the supposed structure of the firm's resources and processes (Neely et al., 1995). In a way, this meant that accounting measures might have to go beyond their role of providing information and develop into management tools¹.

The issue of control has been central to management since the emergence of the field in the early XX century. It was discussed by Taylor (1911) as one of the prerequisites of achieving maximum efficiency and was named one of the five general functions of management by Fayol (1949). As such, it was a service function aimed at ensuring compliance of business activities with the overall plan. This view of control prevailed for several decades, and as late as in 1965, management control was defined as “the process by which managers ensure that resources are obtained and used effectively and efficiently in the accomplishment of the organizational objectives” (Anthony, 1965 cited in Langfield-Smith, 1997, p. 208). Hofstede (1978) criticised this approach as overly mechanistic and failing to reflect the human-centred nature of organisational control systems. He argued that in organisations, a control system should be viewed as a living cell rather than as a set of measuring and communicative devices. Such a system would be controlled locally, governed by human relations, and develop strategically in response to the organisation's environment.

It was not until the 1980s that the link between management control and strategy was examined explicitly. A number of studies investigated the relationship between control systems and decision making (Merchant, 1985), performance evaluation (Gupta, 1987), cost control (Simons, 1987) and other organisational issues in strategic context².

¹ To accomplish this, in the words of Otley (2001), the word “management” needed to be put back into “management accounting research”.

² For a comprehensive review of studies see Langfield-Smith (1997).

Although these studies demonstrated the existence of the relationship between strategy and control systems, their common limitation was the reliance on financial measures in accordance with the dominant role of accounting. This limitation often prevented researchers from understanding the processes underlying the relationships they observed.

In this sense, Simons' work (1987) was exemplary and important for the subsequent development of the field. Studying the relationship between cost controls and strategy, he came to the conclusion that companies pursuing a conservative strategy did not use cost controls intensively, which was inconsistent with their strategic competences. To address this issue, Simons subsequently expanded his research to include non-financial indicators (1990) and in-depth qualitative data (1991), which allowed him to create a theory of using control systems not as a means of ensuring consistency with strategy but as a strategic management instrument (1994) – an instrument for executing and adapting strategy. Others, likewise turning to in-depth qualitative research, found that control systems, far from simply providing a service function, could enable or hamper strategic change (Roberts, 1990; Knights and Willmott, 1993).

2.2.2 Performance measurement – emphasising strategic fit

Commenting on the last point, Langfield-Smith (1997) noted in 1997 that while the intricacies of the dynamic relationship between controls and strategy were an object of interest for the MSC researchers, the contemporary performance measurement community was interested in constructing the measurement system of best fit for any given strategy. In other words, it was the adequacy of measures in terms of the overall strategic context rather than their impact on the process of strategy execution and adaptation that performance measurement scholars stressed. Indeed, the predominant emphasis of their work was the task of ensuring the consistency of measurement systems with strategy (Eccles, 1991; Kaplan and Norton, 1992, 1996a; Neely et al., 1995; Neely, 1998), with behavioural implications of measurement discussed in light of eliciting behaviour consistent with the desired strategy (Neely et al., 1995; Neely, 1999).

Maintaining the relevance of the strategy in the work of these researchers is accomplished through using feedback from measurement to question the validity of the set of assumptions which constitute the firm's strategy. It is this way of using feedback that was called strategic learning (Kaplan and Norton, 1996b; Neely, 1998, 1999). This allowed performance measurement systems to function as sensor devices prompting managers to alter the strategy to ensure its continuous relevance within the firm's business context.

2.2.3 Challenging assumptions or leading change?

Both MCS research and performance measurement research addressed the issue of strategic management, although from different angles. The former emphasised the wider organisational role of control systems in the process of strategy formation and strategic change. Although they first appeared as systems of ensuring the implementation of a set strategy, they evolved to incorporate the understanding of measurement as prescribing learning domains. Such view allowed the managers to address strategic uncertainties and allow the strategy to "emerge" without being preconceived in detail. In a way it was Sartrean existence that - to an extent - preceded essence.

The other viewpoint suggested a more structured way of using performance measurement. It relied on a detailed, if hypothesised, strategy and kept management in control by providing the tools to evaluate, alter and implement strategy. The information provided by measures was "fed back" to the strategists allowing them to challenge and change the mental model of how the firm operated.

2.2.4 Contemporary issues

Towards the late 1990s, as more performance management systems were being implemented, a line of critical literature developed in the PM research (Franco-Santos and Bourne, 2005), examining the problems with applying performance measurement systems. Analysing the reasons the majority of performance measurement programmes fail, Neely and Bourne (2000) discuss design and implementation issues, suggesting that at the implementation stage, the most common causes of failure are related to organisational politics, information management, and attention span. This is further explored in the study by Bourne et al. (2003), who note that performance measurement

processes involved in the design of a performance measurement system can be seen as a mechanism powering organisational change. Mapping performance systems design research against the organisational change literature, the researchers then observe that the former provides little guidance beyond the initial phase of the change process and conclude that for the implementation to be successful, lessons from the change management literature should be considered throughout the implementation process.

In other words, implementation fails when performance measurement fails to become an integral part of organisational reality, when measurement efforts are uncoordinated and seen as imposed. This is consistent with the implications of both earlier research (Bourne et al., 2000), which suggests that performance measurement should be viewed as a cycle of designing, using, and evaluating performance measurement systems, and later studies (Kennerley and Neely, 2002, 2003), which introduce findings from organisational culture, organisational change, and process management literature into the discussion of performance measurement to develop a comprehensive framework of factors that influence the evolution of performance measurement systems. These views echo Hofstede's (1978) point mentioned earlier in the sense that they explicitly address the human relations underlying the process of performance measurement and conceptualise PM systems as living and evolving entities.

2.2.5 Implications for the systematic review

The crucial point of this argument is the fact that performance measurement cannot be an effective management tool – especially in terms of strategic management – unless it is woven into the fabric of organisational reality and viewed as its integral part, evolving with the organisation. It seems then that from the viewpoint of the modern performance management research, the distinction between the MCS research focus and that of performance measurement is less than clear, and the latter can be seen as an instrument for the process of strategic management. In a recent article, David Otley (2003) contends that performance *management* essentially combines both approaches. He argues that performance management is a wider term that, although still addressing the issue of ensuring the execution of objectives, has expanded to include both the methods of challenging strategic assumptions and those of leading strategic learning.

Likewise, Marr argues that performance management can be seen as an organisational approach to managing organisational strategy, which enables "...employees to gain strategic insights which allow them to *challenge strategic assumptions, refine strategic thinking, and inform strategic decision making and learning*" [italics added] (2006, p.4).

2.3 Strategy

The strategic management literature is vast and diverse, and for the purposes of this dissertation it is discussed to the extent that is necessary for informing the area of interest and the formulation of the review question.

2.3.1 The precursors of strategy as a field

According to Jay Barney (2002), before 1980s, strategic management was simply a set of related arguments, which was shaped into an academic discipline by Michael Porter's fundamental work (1980). Before Porter, the strategy landscape was dominated by three giants – Igor Ansoff, Alfred Chandler, and Kenneth Andrews. Their view of strategy, probably influenced by Taylor's thinking (Mintzberg, 1994) revolved around the concept of the strategic plan which was based on data analysis and spelled out the set of initiatives that were to be subsequently implemented. Chandler (1962) famously postulated that the structure of the company would be determined by the strategy it intends to implement. Performance would then follow structure. The work of these researchers also gave birth to the enduring division between the content and the process of strategy (Huff and Reger, 1987), which has since then migrated to other disciplines.

Others criticised the idea of strategic planning (Mintzberg, 1978; Mintzberg and Waters, 1985), arguing instead that strategic decision making always incorporates emergent information and thus can be viewed as a consistent pattern in a stream of decisions. Thus, formulation and implementation converge in the constant process of strategy formation (Mintzberg, 1978). This view is markedly process-oriented.

Central to this approach is the concept of strategic learning, which provides one of the links between this literature and the contemporary performance measurement research. Since planners' knowledge is not identical to that of implementers and since the environment may change, "...implementation feeds back to formulation and intentions

get modified en route, resulting in an emergent strategy” (Mintzberg, 1978, pg. 946). The mechanism enabling this adaptation is the strategic learning which takes place over the course of strategy implementation. Management plays a mediating role between the environment and the forces of organisational inertia and uses strategic learning as a management instrument. The different ways of doing this are related to the earlier discussion of performance measurement and are important for understanding how the review questions should be positioned.

On one hand, strategic learning may be the managers’ prerogative, allowing them to update performance measurement systems to ensure continuous consistency of actions with strategy. On the other hand, learning can be an organisation-wide process, where management simply steers its direction³. Finally, the view of strategy as an adaptive process leads Mintzberg (1978) to question the relationship between strategy and structure mentioned earlier. However, as will be seen later, adopting the organisation theory perspective can help to answer this question.

As mentioned earlier, the discipline of strategic management was significantly shaped by Michael Porter. As Barney (2002) notes, Porter accomplished this by specifying the dependent variable for the research, the appropriate theoretical framework, the unit of analysis, and the broader social issues in the field. Porter suggested that the firm’s potential to generate superior economic performance is determined by the industry characteristics (1979, 1980), and the firms should move to the industries where they can deliver superior buyer value relative to competition (1985, 1987). This view was rooted in the structure-conduct-performance paradigm and as such was closely related to the early strategic thought. In response to this view emerged a competing perspective, which argued that the sources of superior economic performance lay within the firm. This view came to be known as the resource-based view (RBV) of the firm.

2.3.2 The RBV and the notion of dynamic capabilities

Although the roots of the RBV can be found in the 1950s (e.g., Penrose, 1959), it was first articulated by Wernerfelt (1984) and subsequently developed by others (Barney

³ Cf. Simons’ (1995) idea of levers of control or Neely’s (1998) notion of communicating priorities.

1986, 1991; Grant, 1991). Essentially, the RBV states that a firm can be seen as a bundle of heterogeneous and imperfectly mobile resources that through interaction and evolution create a combination of organisational capabilities which give the firm a competitive advantage in the industry. Later, attempts were made to advance this view to the level of a full-fledged resource-based theory of the firm (Conner, 1991; Conner and Prahalad 1996; Grant 1996).

The most recent development in the RBV was the emergence of the notion of dynamic capabilities. Teece et al. (1997) defined this term as the "...ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (pg. 516). This definition was subsequently reviewed and others were suggested (Eisenhardt and Martin, 2000; Zollo and Winter 2002), but the function of dynamic capabilities remains the development and reorganisation of the firm's resources and processes to achieve or sustain competitive advantage. Dynamic capabilities may be viewed as the mechanism behind the firm's adaptive ability, and some researchers (Eisenhardt and Martin, 2000) suggest that their development takes place through strategic learning.

In terms of the focus of this dissertation, dynamic capabilities are critical in the sense that, if strategy execution is viewed as an adaptive process, they may be the mechanism, through which strategy is implemented, i.e. resources are reconfigured in line with strategic priorities. However, since the overarching issue is the use of performance measurement in the process of strategy implementation, it is necessary to clarify the relationship between performance measurement and dynamic capabilities and to examine the nature of this relationship.

Zollo and Winter's (2002) definition of dynamic capabilities offers the greatest potential to illuminate this issue and is the definition adopted in this dissertation. They defined a dynamic capability as "...a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness" (pg. 340). Thus, it is essentially a higher-order

routine, which gives the firm an ability to reconfigure its resources and processes. An example of such a routine is the new product development process (Winter, 2003).

This definition links the discussion of the RBV and dynamic capabilities to the organisational theory literature, which is the last broad area informing the focus of this dissertation and which will be outlined in the next section.

2.3.3 Implications for the systematic review

The preceding discussion helps to understand the contribution of strategic management literature to the research area and assist in formulating the review question. It links the performance measurement research and the process-based view of strategy through the concept of strategic learning. The latter enables managers to challenge strategic assumptions and is also the mechanism driving the development of dynamic capabilities. The definition of dynamic capabilities as hierarchies of routines is necessary to understand how strategic learning is related to performance measurement.

2.4 Organisation Theory

As in the case of PM and strategic management, organisation theory (OT) literature is enormous and impossible to review in a sub-section of a chapter. Therefore, only two theories within the OT domain are reviewed here and only in so far as they inform the positioning of the review question. These are the behavioural theory of the firm and the evolutionary theory. Another qualification is necessary at this point. Within both of these theories, only the insights into organisational performance and processes are relevant, which leaves out the discussion of firms' boundaries of in the behavioural theory literature and the analysis of macroeconomic changes in the evolutionary theory.

2.4.1 Behavioural theory

The behavioural theory of the firm traces its roots to the work of Herbert Simon who introduces a number of "essential simplifications" of the early economic theory concerning the context and the nature of decision making (Simon, 1955). When decision alternatives arrive sequentially and the choice needs to be made immediately, criteria other than economic maximisation come into play. Economic maximisation is likewise unattainable when actors' information processing ability is limited. To address

this, Simon introduces the idea of aspiration level – the desired level of performance, against which decision outcomes can be judged. The distribution of information makes information gathering is costly, which in turn means that the search for the information will stop once a satisfactory outcome can be achieved. Finally, when individuals do not have a clear order of preferences or their preferences are of different nature, they will make the minimum satisfactory decision (Simon, 1955).

In other words, the decision-making ability of individuals is bounded by what March and Simon (1963) call cognitive limits on rationality. They argue that for a boundedly rational decision maker, rationality is relative to the decision context. This in turn means that individuals make decisions within simplified models of real situations. In line with Simon's earlier (1955) proposition, they will respond to the routine demands of this model with a learned routinised response which had been proven to generate a satisfactory outcome. March and Simon (1963) call this response a performance programme. However, although these programs are highly routinised, they incorporate a certain degree of discretionary action. When the demands of the models change, the performance delivered by a performance programme fails to produce a satisfactory outcome, which in turn triggers the search for information and new ways of achieving satisfactory performance. This goal-directed problem-centred change in behaviour lies at the heart of the evolution of performance programs. Simon (1979) considers problemistic search and satisficing to be the central characteristics of the decision-making process.

It is important to note that programmes change only in response to feedback, which is received through organisational communication channels (March and Simon, 1963). Feedback then becomes a necessary part of programme adaptation process. Cyert and March (1963) analyse the notion of feedback-react decision rules, arguing that the process of problemistic search does not start unless and until appropriate performance feedback is received. It is through this feedback mechanism that the organisation learns about its performance and modifies its behaviour to maintain adequate (in relation to the aspiration level) performance. Finally, it is important to note that the adaptation of behaviour through the change in performance programmes is only one possible response

to performance feedback. The others are the adaptation of goals (change in the aspiration level)⁴, the adaptation of search rules and the attention rules. The latter relates directly to the choice of performance measures – it guides the change of behaviour towards conformance with the measures that indicate that performance is satisfactory (Cyert and March, 1963).

These first insights into the role of performance feedback in organisational learning were further developed into the aspiration-level theory (Greve, 1998) or performance feedback theory (Greve, 2003), which is a direct descendant of the early behavioural theory. The main statement of the aspiration-level theory is that organisational learning⁵ takes place when performance feedback indicates that performance relative to the organisational aspiration level has changed. The theory is concerned with learning at the organisational level of analysis (Greve, 1998) and states that the impact of performance feedback on organisational learning depends on the current level of performance relative to the aspiration level. When feedback is deemed positive, it inhibits learning more effectively than negative feedback stimulates it.

2.4.2 Evolutionary theory

While the behavioural theory is more closely related to the discussion of PM, the evolutionary theory offers a complementary insight into the nature of organisational learning, linking it to the strategy literature. The evolutionary theory was developed by Richard Nelson and Sidney Winter, who described the subject of the theory as the “dynamic process by which firm behavior patterns and market outcomes are jointly determined over time” (Nelson and Winter, 1982, p.18).

2.4.2.1 Organisational routines

Central to this theory is the concept of organisational routines. Nelson and Winter (1982) define routines very broadly, and the latter include organisational processes of

⁴ It is important that for behavioural theorists, goals are not viewed as targets. Rather, they represent a set of constraints that describe a range of satisfactory outcomes. Decision makers seek to satisfy these constraints (Simon, 1976). Therefore, performance is evaluated against such constraints, some of which can be represented by performance measures.

⁵ Here, organisational learning is demonstrated through changes in behaviour. Cf. Greve (1998): “An organization learns when its experience results in behavioral changes”. It is a relatively narrow view; Huber (1991), while still adopting the behavioural perspective, states that “an entity learns if, through its processing of information, the range of its *potential behaviours* is changed” (pg. 89).

various complexity, from simple technical routines to corporate strategies. However, they fall into three categories based on their time span and function: operating characteristics that do not change in the short run; processes that control the changes in the stock of capital; and higher-level routines that modify operating characteristics. Routines for evolutionary theorists are very similar to the performance programmes of the behavioural theorists. They are learned sequence of actions, whose execution does not require significant cognitive effort, and they can incorporate different degrees of change in the process of their development.

What is important here is the idea of the hierarchy of routines. While some routines play operational roles, others perform an organising function, altering the functions and configurations of other routines. As such, an organisation may be viewed as a set of routines of different order. Whenever the feedback from the firm's environment indicates that organisational performance becomes inadequate to the external conditions, a "routine-guided, routine-changing" process of search is initiated, whose goal is to adapt the routines to the new environmental conditions (Nelson and Winter, 1982, p.18). As Cyert and March (1992) note, this search stimulates learning which leads to organisational change.

Since the fundamental work of Nelson and Winter (1982), the concept of organisational routines has migrated into other disciplines and has been widely applied, particularly in the area of organisational change (Tranfield and Smith, 1998, Feldman, 2000; Becker et al., 2005). This was facilitated by the understanding of the balance between the processual nature of routines and their role in forming the organisational structure. As Pentland and Rueter famously state, "routines occupy the crucial nexus between structure and action, between the organization as an object and organizing as a process" (1994, pg. 484). Indeed, if organisations could be viewed essentially as structured sets of processes, change could be accomplished by changes in the content or the structure of the processes. In the understanding of this relationship lies a great potential to apply the concept of routines to the analysis of change. In this sense, Chandler's point of structure following strategy may regain validity, as in the process of strategy execution, routines will adapt to form a new and consistent structure. Although the development

and application of the concept has been largely chaotic, there have been several recent attempt to “clean up” the field by systematising the literature (Becker, 2004), clarifying the concept (Becker, 2005a) and addressing methodological (Pentland and Feldman, 2005) and empirical (Becker, 2005b) issues.

2.4.2.2 Action or representation?

Besides the crucial insight that the understanding of routines’ processual nature gives to the process of strategy execution, the issue that is important for this discussion is the “great divide” between understanding routines as behavioural patterns and as cognitive regularities.⁶ Simply put, the question is whether routines should be seen as recurrent patterns of action (e.g., Nelson and Winter, 1982; Teece et al., 1997, Edmondson et al., 2001) or as mental rules or heuristics (e.g., Simon, 1976; Cohen, 1991). Feldman and Pentland (2003) propose the distinction between the *ostensive* (abstract model) and *performative* (specific action) aspects of routines and argue that these aspects are inseparable as one constantly shapes the other. In their view, this distinction helps to explain the change potential of routines. Likewise, Becker (2005a) proposes the distinction between the understanding of routines as *action* and *representation*⁷. Action and representation, behavioural and cognitive, performative and ostensive are different ways of describing the two levels of existence of organisational routines.

2.4.3 Implications for the systematic review

Learning takes place through the modification of learned performance programmes. Performance feedback is interpreted vis-à-vis the organisational aspiration level and triggers the appropriate changes in behaviour, which is understood as a demonstration of the organisational learning. Seen as routines, these programmes are organisational building blocks of different order, and by incorporating performance feedback through iterations they facilitate changes in structure through the process of organisational learning.

⁶ See Becker (2004, 2005a) for an in-depth discussion of this issue. There is also an emerging third way of understanding routines – as propensities to express a certain action (e.g., Hodgson and Knudsen, 2004).

⁷ And also the “deep” level which is the mechanism that triggers the routines. Becker notes that this aspect is not covered in the routines literature at all.

2.5 Positioning the Review Question

Performance measurement has evolved into a strategic management instrument. As the behavioural implications of measurement came into play, the debate shifted from designing accurate performance indicators to managing through performance measurement. The ways it is used for this purpose can be different – from enabling managers to challenge the assumptions underlying their model of the relationships between resources and outcomes to using measures as a tool to guide the process of strategy execution throughout the organisation.

Regardless of the way that is chosen, performance measurement acquires strategic meaning through the mechanism of strategic learning. It is the notion of strategic learning that, in terms of the focus of this dissertation, links the PM and the strategy literature. The strategy literature demonstrates that strategic learning is precisely what enables a strategy to be realised. Performance measurement in turn enables this learning to take place, since in one of its guises, it is a set of feedback-generating devices that, when implemented successfully, is an organic part of the organisation, which makes managing strategy through performance measures possible.

The organisation theory perspectives reviewed above lend an insight into the mechanics of this relationship. As the strategy literature suggests, dynamic capabilities are the mechanism for rearranging resources to address strategic priorities. As such, they are a logical means of driving strategy execution. When, following Zollo and Winter (2002), dynamic capabilities are viewed as higher-order routines responsible for organizing resources and processes, it is routines that become the object of management. It means that, rather than forcing conformance to the planned strategy, strategic priorities need to be communicated to the higher-order organizing mechanisms. This would compel adherence to strategic direction, while allowing the emergent trends to be noticed and incorporated into the strategy during the implementation process. Thus, if dynamic capabilities, which are responsible for reconfiguring resources consistent with changes in strategy, need to be changed, it is routines within their structure that need to be affected.

Performance measurement has a dual role in accomplishing this task. In its traditional application, it can be used to provide information about the characteristics of routines to inform the subsequent actions of the management – to “measure” them. Performance management would provide the context for these measures, incorporating them into a comprehensive performance management system, connecting them with other measures and linking them with the overall firm’s strategy.

Organisation theory, however, highlights a different way to use performance measures for affecting organisational routines. It spells out the mechanics of strategic learning and thus illuminates the relationship between performance measurement and strategy. As behavioural theorists demonstrated, routinised performance programmes change in response to performance feedback. Performance measures can thus be used as feedback-generating devices, which, placed strategically within the routine-based structure of dynamic capabilities, will provide performance feedback necessary for the desired change in the routines. Consequently, if routines are viewed as building blocks of dynamic capabilities, performance measures can be used to manage the development of dynamic capabilities. The latter, as was discussed above, are the capabilities that reconfigure the structure of the firm’s resources and processes to address the new strategic priorities.

This view is most closely related to Simons’ (1995) notion of interactive control measures. However, exploring the strategy literature further and adopting the organisational theory lens provides an insight into the mechanics of this interaction on the micro level as well as illuminates the relationship between performance measures and strategic management. The argument presented here is also different in the sense that it adopts a structural, not an interactive perspective. Under the RBV, dynamic capabilities are the coordinating mechanisms which enable strategic change that constitutes strategy implementation. According to evolutionary theorists, dynamic capabilities are higher-order routines. The latter change in response to performance feedback, which can be purposefully provided by performance measures when they are used as a management instrument.

As this dissertation clearly focuses on the relationship between performance measurement and strategy, the organisation theory perspectives are employed to the extent that they provide a valuable insight into this relationship. *In terms of strategy*, the view outlined in this chapter builds on the insights of Zollo and Winter (2002) and is positioned within the strand of the strategic management literature that understands strategy as a process. The value of managing strategy execution through affecting dynamic capabilities lies precisely in the fact that it focuses on coordination and maintaining the overall strategic direction while allowing for the incorporation of emergent factors. *In terms of performance management*, this argument focuses on measuring for purposes internal to the firm and belongs to the area of performance measurement concerned with ‘managing through measures’.

2.6 Systematic Review Questions

In its condensed form, the overall research interest revolves around using performance measurement to drive strategy execution. The results of the narrative review suggested that this could be accomplished by applying performance measurement to organisational routines and determined two broad ways in which this could be done. As the understanding of these will be crucial for the subsequent doctoral research, the questions for the systematic review were determined accordingly.

Review Question: *How is performance measurement applied to organisational routines?*

RQ1: How are organisational routines measured?

Measurement is viewed here in the widest possible sense and includes different types – quantification, indication, etc. It is expected that the systematic review will yield a list of characteristics of routines, for which some metrics have been developed.

RQ2: Is performance measurement used for facilitating learning through organisational routines?

Here, the interest lies in the learning-facilitation function of measurement, where measures are used to generate feedback about performance and facilitate learning by channelling feedback into organisational routines.

3 Method

3.1 The Systematic Review

A systematic review of literature is a structured and transparent way of analysing the available evidence in order to inform the decision making process. It has been employed in medical research (Mulrow, 1994) and has migrated to the field of management (Tranfield et al., 2003a). It has been argued that the advantage of systematic reviews lies in their transparency and replicability, as they make researchers' decisions and biases explicit (Tranfield et al., 2003a). Transparency and replicability in turn make literature reviews stronger and more rigorous than traditional narrative reviews, thus providing a solid basis for informing theory and practice. This chapter is essentially a protocol of the systematic review that adheres to the general principles outlined in the literature and follows the structure advocated by Cranfield School of Management⁸:

Phase I: Planning the Review

1. Forming a review panel
2. Mapping the fields
3. Producing a review protocol

Phase II: Identifying and evaluating studies

1. Conducting a systematic search
2. Evaluating studies

Phase III: Extracting and Synthesising Data

1. Conducting data extraction
2. Conducting data synthesis

Phase IV: Reporting

1. Reporting the findings

Phase V: Utilising the Findings

1. Informing Research
2. Informing Practice

⁸ Source: Cranfield School of Management (www.cranfieldonline.com)

The narrative review presented earlier contains the maps of the fields that were used in this systematic review. It is also necessary to say that the process of this review stops at the stage of informing research. This is partly caused by the highly academic nature of the main concept of the review – organisational routines – and partly by the time limitations of the project.

3.2 Consultation Panel

A literature review, especially if it is cross-disciplinary in nature, cannot be performed in isolation. A researcher will receive valuable input from outside sources at different stages of the review process. In line with the goal of ensuring maximum transparency, the list of experts identified for the systematic review is provided in Table 1.

Not all of the experts were approached, however. Due to the time limitations on this study and the number of studies reviewed before a coherent list of sources was created, it was possible to receive comments only from several panel members. The names of those whose input was used in the systematic review are marked with an asterisk.

Dr Mike Bourne is the supervisor of this project and a senior lecturer, whose expertise spans performance measurement and strategy. His input was received at the planning stage, during the initial defence of the research design in May, 2006, at the stage of expanding the consultation panel, and during the process of adding studies that were not identified through database searches.

Mr Bernard Marr is an expert in performance measurement and a specialist in measuring intangibles. Again, his input was received at the planning stage, during the initial defence of the research design in May, 2006, at the stage of expanding the consultation panel, and during the process of adding studies that were not identified through database searches.

Dr Silvia Svejenova is a specialist in organisation theory. Her input was received at the stage that preceded the formal design of the study and helped to clarify key concepts and perspectives.

Dr David Denyer is a specialist in the systematic review method. His lectures and workshops provided the basis for the design of this review.

Monica Franco-Santos and Pietro Micheli are PhD students who have experience with doing systematic reviews at Cranfield School of Management and whose area of interest is related to the focus of this dissertation. Their help was received during the execution stage, when the process of selection was carried out, and at the stage when sources not identified through searches were added.

Ms Heather Woodfield is an information specialist and was approached at the stage of designing search strings that were most appropriate for selected databases.

Prof J-C Spender, Prof Umit Bititci, Dr John Mills, Prof David Otley, and Prof David Teece were identified as experts in their respective fields but were not approached due to the reasons stated earlier. Thus, the consultation panel in this review was clearly Cranfield-centred, indicating a possible bias that needs to be acknowledged.

Another factor contributing to the possible bias of the panel is the absence of practitioners. However, this is mitigated by the fact that the nature of the reviewed subjects is highly academic and by the fact that many of the panel members have substantial practical experience.

3.3 Personal Statement

If the systematic review of literature is to be transparent, the author's aims and biases need to be acknowledged. This inquiry is driven by the author's interest in the behavioural aspect of measurement, i.e., in using measurement not as a means of evaluating objects and processes against a pre-determined scale, but as an instrument of managing organisations through stimulating organisational learning. This review is a stepping stone on the way to the doctoral programme, and its ultimate goal is to determine a question worthy of further research that could potentially serve as a basis for a PhD research project.

Name	Title	Organisation
Bourne, Mike *	Director, Senior Lecturer	CBP, Cranfield University
Marr, Bernard *	Research Fellow	CBP, Cranfield University
Spender, J.-C.	Visiting Professor	CBP, Cranfield University
Svejenova, Silviya *	Assistant Lecturer	ESADE Business School
Bititci, Umit	Director, Professor	CSM, University of Strathclyde
Mills, John	Senior Research Associate	University of Cambridge
Otley, David	Professor	Lancaster University
Teece, David	Professor	University of California - Berkeley
Denyer, David *	Senior Research Fellow	CMKSC, Cranfield University
Franco-Santos, Monica *	PhD Student	CBP, Cranfield University
Micheli, Pietro *	PhD Student	CBP, Cranfield University
Woodfield, Heather *	Information Specialist	Kings Norton Library, Cranfield University

Table 1. Panel of experts selected for the systematic review.⁹

It needs to be acknowledged that the choice of methods and the research approach should reflect the object of research, and routines, however defined, are difficult to measure with the rigour of the traditional measurement theory. Nonetheless, it needs to be said that in this sense, the author is still slightly biased, preferring quantitative studies as more conclusive, generalisable, and valuable overall. This bias was kept in mind during the quality appraisal stage and care was taken to avoid making imbalanced decisions on its basis.

There were no conflicts of interests that influenced the process and the findings of this systematic review.

⁹ The names of the experts who were approached during the systematic review process are marked with an asterisk. All of them provided help and recommendations regarding the structure and content of the review.

3.4 The Context – Summary of the Narrative Review

As the narrative review suggested, this research is informed by three broad fields: business performance measurement, organisation theory, and strategy¹⁰. The idea that connects these fields in this study is the following: organisational routines, which trace their roots to the ideas of behavioural theorists (Cyert and March, 1963) and which became a widely accepted object of research after the seminal work of Nelson and Winter (1982), have come to be seen as building blocks of organisational dynamic capabilities (Zollo and Winter, 2002). The notion of dynamic capabilities emerged from the strategy literature, more specifically from the resource-based view of the firm (Wernerfelt, 1984; Grant, 1991), where they have come to be seen as the capabilities that allowed the firm to reconfigure its resources and processes to address the needs of the business environment (Teece et al., 1997).

Viewed this way, dynamic capabilities represent a logical tool for driving strategy execution, as they reconfigure the firm's structure to reflect the new strategic priorities. If, as was argued earlier, they could be seen as composed of organisational routines, they could be managed through affecting the routines. Performance measurement with its emphasis on strategy (Kaplan and Norton, 1996; Neely, 1998, Simons, 1995) provides one of the mechanisms of affecting routines. On one hand, routines are processes that could be measured and modified if necessary – in business performance literature, this corresponds to the notion of challenging assumptions about the structure of the firm's resources and processes (Neely, 1998). On the other hand, routines are known to change in response to performance feedback (Nelson and Winter, 1982; Cyert and March, 1992; Greve, 2003). Since feedback generation is one of the functions of performance measurement, performance measurement systems could be configured to provide the appropriate information to drive the change in routines, and consequently, affect dynamic capabilities. These two ways of applying performance measurement to organisational routines determine the focus of this review.

¹⁰ See Figure 1 and Figure 2 for the maps of the literature domains.

3.5 Aim of the Review and Research Questions

The aim of this systematic review was to examine academic management literature for the evidence of applying performance measurement to organisational routines – conceptually or empirically. Performance measurement can be applied to this process in two ways: either in its function of identifying the characteristics of routines and feeding this information to management or in its role of a feedback-generating mechanism, feeding the information back into the process to facilitate learning. This systematic review aimed to examine the evidence of the use of these two approaches.

The specific research question followed this aim:

Research Question: *How is performance measurement applied to organisational routines?*

RQ1: How are organisational routines measured?

RQ2: Are measures used for facilitating learning through organisational routines?

3.6 Search Strategy

This systematic review considered only secondary data in printed publications and only academic literature. Hence, two main sources of material were used: electronic databases and the recommendations of the consultation panel.

The recommendations of the panel members concerning the literature were incorporated at the later stages, when the final pool of core articles was created. The list was sent to the experts mentioned above, and the additional sources they proposed were run through the selection and quality appraisal process.

The database search strategy, however, was spelled out in advance and defended before the MRes review panel in May, 2006.

3.6.1 Keywords and search strings

Based on the narrative review of literature and on the recommendations of panel members, search keywords were determined that were later used for constructing search strings. Table 2 illustrates the relationship between the concepts and the chosen keywords and spells out the rationale for the choice.

Concept	Keyword(s)	Rationale
Performance Measurement (general)	Performance measurement	Ensures inclusion of a) various synonyms used for performance measurement in the literature; b) sources related to management control research, which is a complementary perspective.
	Performance assessment	
	Performance appraisal	
	Performance evaluation	
	Strategic control*	
	Managem* control	
Measurement (applied to routines)	Control system*	The literature on routines does not talk about "measurement" explicitly. Rather, measurable characteristics are identified in the process of analysing or applying routines.
	Operational*	
	Conceptual*	
	Measur*	
Learning from performance feedback	Apply*	Related to the concept of learning through incorporating performance feedback into routines. Ensures inclusion of issues related to strategic management, which is the focus of the scoping study. Is configured to focus on organisational rather than individual learning.
	Understand*	
	Organi?ational learning	
	Strategic learning	
	Feedforward	
Organisational Routines	Feed-forward	Configured to search for all sources mentioning routines, routinised responses, routinised behaviour, etc. Ensures that irrelevant or general usage words are excluded.
	Performance feedback	
	Routin* AND NOT (Routing OR Routinely)	

Table 2. Search keywords.

It is important to note that the literature on organisational routines does not use the term “measurement” or “evaluation” but discusses the estimation of various dimensions of routines in the process of their operationalisation; hence, the search was expanded to include the terms “operationalisation”, “application”, etc. The actual “measures” were determined during the data extraction stage.

The keywords were used to construct the search strings so that the latter reflected the review questions stated above. The complete strings corresponding to each research question are presented in Table 3.

RQ	String	Human Language
RQ1	(operational* OR conceptual* OR measur* OR apply* OR understand*) AND (routin*) AND NOT (routing* OR routinely)	How are ORGANIZATIONAL ROUTINES MEASURED?
RQ2	(Organizational learning OR strategic learning) AND (performance feedback OR feedforward OR feed-forward) AND (perform* measure* OR perform* assessm* OR perform* eval* OR perform* appraisal OR managem* control* OR control system* OR strategic control*) AND (routin*) AND NOT (routing* OR routinely)	ORGANIZATIONAL LEARNING through PERFORMANCE FEEDBACK OR FEEDFORWARD channelled into ORGANIZATIONAL ROUTINES by PERFORMANCE MEASURES.

Table 3. Complete search strings.

Some of the keywords used in the search strings for the RQ2 were truncated in order to meet the restrictions of the search fields in the databases. However, the use of the wildcard ensured that no sources were lost¹¹.

3.6.2 The pilot search

A pilot search was run to see whether the strings would yield analysable results. The pilot search was run in the ABI/INFORM database and was made very detailed, serving as a representative search for the chosen databases. EBSCO was used to check the availability of full-text sources.

The trial search indicated that the search string developed for the sub-question RQ2 returned zero results. Assuming that the search strings were accurate and appropriate, this probably indicated the absence of studies that considered simultaneously all four areas included in RQ2. To solve this problem, the search string was broken down into the individual concepts and the latter were paired up. Each unique pair of strings was performed as a separate search in the databases. The pairs and the corresponding search goals are presented in Table 4.

¹¹ This was verified by several trial searches.

RQ	Pair	String	Looking for
RQ2	ABCD	(Organi?ational learning OR strategic learning) AND (performance feedback OR feedforward OR feed-forward) AND (perform* measure* OR perform* assessm* OR perform* eval* OR perform* appraisal OR managem* control* OR control system* OR strategic control*) AND (routin*) AND NOT (routing* OR routinely)	ORGANISATIONAL LEARNING through PERFORMANCE FEEDBACK OR FEEDFORWARD channelled into ORGANIZATIONAL ROUTINES by PERFORMANCE MEASURES
	AB	(performance feedback OR feedforward OR feed-forward) AND (Organi?ational learning OR strategic learning)	Organisational learning from performance feedback
	AC	(Organi?ational learning OR strategic learning) AND (routin*) AND NOT (routing* OR routinely)	Learning conceptualised as changes in routines
	AD	(Organi?ational learning OR strategic learning) AND (perform* measure* OR perform* assessm* OR perform* eval* OR perform* appraisal OR managem* control* OR control system* OR strategic control*)	Organsitional learning discussed in PM context; role of PM in organisational learning
	BC	(performance feedback OR feedforward OR feed-forward) AND (routin*) AND NOT (routing* OR routinely)	Feedback discussed in the context of organisational routines
	BD	(performance feedback OR feedforward OR feed-forward) AND (perform* measure* OR perform* assessm* OR perform* eval* OR perform* appraisal OR managem* control* OR control system* OR strategic control*)	Feedback discussed in PM context; feedback when used for strategy implementation or strategic learning
	CD	(perform* measure* OR perform* assessm* OR perform* eval* OR perform* appraisal OR managem* control* OR control system* OR strategic control*) AND (routin*) AND NOT (routing* OR routinely)	PM discussed in conjunction with organisational routines

Table 4. Paired search strings for RQ2.

The sources identified through the searches were later synthesised to produce an answer to the full question RQ2.

3.6.3 Databases

The electronic databases in which the searches were performed included:

- ABI/INFORM Global and Trade and Industry
- EBSCO Business Source Premier

The strings were entered into the *citation and abstract* field (ABI/INFORM) and *default fields* (EBSCO) of articles in electronic databases. The information included in the fields was compared to ensure that the searches in both databases included the full citation, the abstract, etc. Only *peer reviewed* studies from the databases were considered, as they were seen as more rigorous and their results as more reliable.

The choice of the databases was driven by the general nature of the research questions. Aiming to examine the overlap of very broad issues, the research questions were not constrained (or particularly well informed) by any specific sector. Thus, the preference was given to general-focus databases with wide coverage, rather than more specific databases such as Science Direct (science and technology management), Sociological Abstracts (sociology and human relations), etc.

ABI/INFORM Global and ABI/INFORM Trade and Industry are among the most comprehensive and widely used databases for academic research, and ABI/INFORM Global alone offers access to over 2,700 publications across different management disciplines with the majority of them in full-text (ProQuest, 2006). They also provide access to archived sources. Finally, they were recommended by the specialists in Kings Norton Library.

EBSCO is the most widely used full-text database, which provides access to over 8,800 periodicals (EBSCO Publishing, 2006). It is a general-purpose management research database, whose primary strength lies in the number of full-text articles, and it was also recommended by Kings Norton Library staff.

It was decided not to run the searches in *Elsevier*, *Emerald* and *Wiley*, which provide full access to a limited number of publications, but to use them as a source of retrieving the full-text of specific articles generated, but not fully given access to, by the comprehensive databases.

3.6.4 Other sources

Table 5 reflects the ways in which other sources were used during the review process.

3.7 Selection

3.7.1 General selection criteria

General selection criteria were applied to the titles and abstracts of the sources returned by the searches and recommended by the panel. The purpose of this stage was to

determine the sources relevant to the research questions of the systematic review, regardless of scholarly quality.

Type of Source	Inclusion	Rationale
Books	On the basis of pannel recommendations	Books are usually less academically rigorous than journal articles. Exceptions cannot be identified through searches and would be included on the basis of panel recommendations. No books were recommended, however.
Reports from institutions, public bodies, agencies, etc.	On the basis of pannel recommendations	As they are not directly searchable, they would be included based on panel recommendation. None of these sources was recommended, however.
Dissertations	No	Not as academically transparent as journal articles. Publication is not systematic and may lack rigour.
Conference papers	No	Conference papers are usually pilot runs for journal articles and are rarely academically rigorous.
Working papers	No	Working papers are not final versions and are rarely peer reviewed, hence lacking academic rigour.
Documents on the Internet	No	The review looked for evidence in printed publications only. Internet sources may be questionable or temporary.

Table 5. Other sources.

The general selection criteria are summarised in Table 6.

The papers that remained after these criteria were applied were entered into a ProCite database, and further actions were taken based on the full text of the articles.

3.7.2 Second screening

It needs to be said, however, that due to the cross-disciplinary nature of the review questions and the deliberately broad search strings, a number of papers that passed the general selection criteria were still found to be insufficiently relevant for the review questions. These papers were excluded from the process. However, this time the decision was based on the full text of the articles and recorded in the ProCite database¹².

¹² See section 6.2.2 for the discussion of this point in terms of research design.

Category	Inclusion Criteria	Rationale
Sector	All	The issues of PM, strategy and learning are equally relevant in the private and public sectors
Industry	All	The industry is irrelevant to the focus of this systematic review
Location	All	The location of the study is irrelevant to the focus of this systematic review
Journals	All disciplines, but peer reviewed only	Captures all perspectives on measurement and routines, regardless of the discipline. Ensures academic rigour.
Language	English only	Main research in organisational routines, strategy, and performance research is published in English
Time	Starting 1982	Routines became a fully accepted focus of academic interest after the publication of Nelson and Winter's 1982 work (Nelson and Winter, 1982).
Focus	Operationalisation or application of the concept of organisational routines	The estimation of various characteristics of routines is discussed in the context of their operationalization or application. Related to RQ1.
	Concrete measures, indicators or other ways of operationalising the measurable dimensions of routines	Pointing out a measurable dimension of the routines without suggesting the ways of operationalising it is irrelevant to the focus of the review. Related to RQ1.
	Relationship between feedback, routines, and organisational learning	Examines the learning-facilitating function of measurement. Related to RQ2.
	Organisational learning	Literature on individual learning is irrelevant to the focus of this systematic review
	Learning from performance feedback	Other forms and aspects of learning are irrelevant to the focus of this systematic review

Table 6. General selection criteria.

3.7.3 Selection criteria for full-text papers

Stricter criteria were applied to the articles that passed the screening stages. The following criteria were applied to the documents in the review:

Conceptual / theoretical papers were included if they contained:

- A clear reference to the theoretical base, model or framework, on which the discussion is based;

- If the work is cross-disciplinary (e.g., strategy and organisation theory or organisational change and performance measurement), a clear indication of the grasp of the relevant arguments in all disciplines;
- A comprehensive relevant review of literature with the indication of key authors, themes and contributions;
- A clear positioning of the argument within the existing theory;
- The basis for proposing a specific measure of organisational routines (if related to RQ1);
- The explicit theoretical links between two or more of the following concepts: performance feedback, organisational learning, performance measurement, organisational learning, organisational routine (if related to RQ2).

Conceptual / theoretical papers could be included if they contained:

- A list of suggestions for further research related to determining the measurable characteristics of organisational routines and/or to researching the link between performance measurement and organisational routines.

Empirical papers were included if they contained:

- A clear reference to the theoretical base, model or framework, on which the discussion is based;
- If the work is cross-disciplinary (e.g., strategy and organisation theory or organisation change and performance measurement), a clear indication of the grasp of the relevant arguments in all disciplines;
- A comprehensive relevant review of literature with the indication of key authors, themes and contributions;
- A clear positioning of the argument within the existing theory;
- An adequate description and full rationale for selecting a specific method;
- A sufficient record of empirical work (discussion of interviews, field work, questionnaires, tools for data analysis, etc);
- A discussion of the impact of finding on the question of identifying the measurable characteristics of organisational routines (if related to RQ1);
- A discussion of the impact of finding on the understanding of the link between performance measurement and organisational routines (if related to RQ2).

Methodological papers¹³ were included if they contained:

- A clear reference to the theoretical base, model or framework, on which the discussion is based;
- A full discussion of the proposed method / improvement of the method
- Clear relevance to the issue of identifying the measurable characteristics of organisational routines (if related to RQ1);
- Clear relevance to the issue of understanding of the link between performance measurement and organisational routines (if related to RQ2).

3.8 Quality Appraisal

The papers that met the stricter selection criteria were subjected to the quality appraisal process. Each article was rated on the scale of 1-3 within the following categories:

- Grasp of the existing knowledge
- Strength of the argument
- Methodological rigour
- Contribution to the field

An article was accepted if it achieved the average score of 2.25. Exceptions were made for five articles that received the score of 2.0 and one that scored 1.5 on the basis of high relevance and centrality to the arguments in their respective fields.

Specific quality appraisal criteria are provided in Table 7.

3.9 Cross-referencing, Panel Recommendations and Data Extraction

3.9.1 Cross-referencing

The references in the publications that passed the quality assessment stage were used to identify additional sources of information relevant to the focus of this systematic

¹³ No methodological papers were included in the final list of sources in this review.

review. These sources were subjected to the same selection and quality assessment criteria as the original publications.

Category	Rating		
	1 - Low or Absent	2 - Medium	3 - High
Grasp of the existing knowledge	Not enough information to assess; no awareness of the major arguments; theoretical/knowledge base insufficient for argument.	Awareness of the major arguments; demonstrated ability to use it to support the argument.	Fully aware of the spectrum of arguments in the field(s). Confident positioning of the argument in existing knowledge. Critical review.
Strength of the argument	Not enough information to assess; argumentation is weak and logic is prone to questioning.	The argument is well-constructed and applicable to the research, reflects the major arguments in the field.	The argument is strong and reasoned out, logical, and related to the existing knowledge; can be extended to the empirical stage.
Methodological rigour: design and execution of the study	Not enough information to assess; design is flawed and does not reflect the argument. Data invalid or insufficient. Poor execution.	Design reflects the argument, the data are relevant and sufficient with minor reservations. Good execution.	Strong links between the design and the argument, original design, good quality and sufficient data. Excellent execution.
Contribution to the field	Not enough information to assess; contribution is unclear or nonexistent.	Incremental contribution. Uses extensively others' ideas and arguments.	Clear advancement of the knowledge/methods. Highly original, supported by data.

Table 7. Quality appraisal – categories and criteria.

3.9.2 Panel recommendations

The list of sources that passed the quality assessment stage was shown to the members of the consultation panel with a request to suggest relevant additions. Again, the recommended sources were run through the same selection and quality assessment process.

3.9.3 Data extraction

The data that were necessary for answering the review questions were extracted using the ProCite database and a specially designed MS Excel spreadsheet that allowed descriptive analyses to be performed quickly. The information extracted included generic information and the factors that were relevant to the focus of this review. The customised data extraction form is presented in Appendix B.

3.10 Synthesis

At the synthesis stage, the findings were integrated with an aim of producing an insight into the explored subject. Due to the nature of management research, performing a meta-review (pooling the data to re-run the analysis) would have been meaningless. Instead, the evidence extracted from the sources was analysed thematically. The approach taken at this stage was most closely related to narrative synthesis, which is tolerant of the diversity in research design of the reviewed studies and one of whose goals is developing or advancing models (Denyer and Tranfield, 2006). As such, narrative synthesis was the most suitable method for the aim of this review.

The differences in applying performance measurement to organisational routines suggested by the findings from RQ1 and RQ2 were analysed and an integrative model was developed.

3.11 Results of the systematic review

3.11.1 Summary of the process

Following the process outlined in this chapter, the systematic review yielded 51 articles for both sub-questions, which were synthesised into an integrative model to answer the primary review question. The summary of the process is presented in Figure 3.

	RQ1	RQ2	Total
Identified through database searches	808	479	1,287
Excluded based on selection criteria	735	426	1,161
Total Reviewable Rources from Databases	73	53	126
Added through cross-referencing	14	3	17
Added based on panel recommendations	-	6	6
Added after reclassified from the other RQ	-	1	1
Not received from The British Library in time	(7)	(1)	(8)
All Reviewed Sources	80	62	142
Excluded duplicates (RQ1 and RQ2)	-	(1)	(1)
Excluded based on quality criteria	(5)	(7)	(12)
Excluded as insufficiently relevant	(55)	(23)	(78)
All Sources included in the Systematic Review	20	31	51

Figure 3. Summary of the systematic review process¹⁴.

¹⁴ To avoid double counting, the numbers in the first line of the table represent an average of the number of sources found through EBSCO and through ABI/INFORM. However, in both databases *all* abstracts were reviewed.

3.11.2 *List of included sources*

The list of included sources with an abridged summary of extracted data is presented in Appendix A¹⁵.

¹⁵ In order to avoid confusion, the sources included in the systematic review did *not* appear in the reference list at the end of the dissertation, unless they were explicitly mentioned in the text. Appendix A provides sufficient information for locating the rest of the documents.

4 Findings

This chapter presents the findings of the systematic review, which are organised into two categories: descriptive findings, which report on the various characteristics of the included studies, and thematic findings, which summarise the major ideas and arguments presented in the studies. Together, these findings help to paint the picture of the reviewed literature.

4.1 Descriptive Findings

This section summarises the descriptive characteristics of the reviewed sources, which help to draw a rich picture of the field.

4.1.1 Geographic location

This section organises the sources identified through the systematic review according to the geographic location of the study (for empirical papers) or the author (for conceptual papers).

Location of study/author	Number
US	29
UK	5
Norway	3
France	3
Australia	3
The Netherlands	2
Sweden	2
INTL	2
Israel	1
Germany	1
Denmark	1
Canada	1

Table 8. List of studies by geographic location¹⁶.

The table suggests that most of the work in this field is done by American researchers, with research from the UK being in the second place.

¹⁶ Although the total number of studies included in the systematic review was 51, adding the number of sources in the table produces 53. This is caused by the fact that several studies were performed by researchers in different countries. Where the number of countries was 3 and greater, the location was marked INTL for *international*.

4.1.2 Nature of inquiry

Approximately 30 percent of the sources were conceptual, where the contribution was produced on the basis of literature review and theoretical conjectures. In terms of research design, the methods used were nearly evenly split between quantitative and qualitative:

Nature of Research Design	Citation
Qualitative approach	20
Quantitative approach	19
Combined qual. and quant.	1
Analysis of literature	11

Table 9. List of studies by the research approach.

4.1.3 Chronological analysis

The number of sources informing the review is slowly increasing, indicating the incremental growth in the interest towards the research issues discussed in this dissertation. The earlier studies tend to be focused on one or two disciplines. The later ones, however, offer cross-disciplinary insights and are thus more relevant to the nature of the review questions. The drop in the number of sources published in 2006 is explained by the fact that data collection was completed by late July/early August of 2006; the numbers, therefore, reflect only 7 months worth of research. Considering that all four of the included 2006 studies were empirical and cross-disciplinary, the number is likely to reflect a trend and rise by the end of the year.

4.1.4 Context

Studies were performed in a wide variety of industrial and public sector settings, which suggests that the reviewed issues are relevant in different organisational contexts. Health Care and the public sector, however, are the obvious leaders.

Year	Total
1985	1
1986	1
1987	1
1990	1
1991	2
1992	4
1994	2
1996	2
1997	2
1998	3
1999	1
2000	3
2001	4
2002	4
2003	4
2004	6
2005	6
2006	4

Table 10. Chronological list of studies.

Industry/Sector	Total
Aerospace	1
Banking	2
Chemicals	1
Construction Equipment	1
Financial Services	1
FMCG	1
Food	1
Health Care	4
Health Care Products	1
Higher ed.	2
IS service	1
Oil refineries	1
Public Service	3
Quick-printing	1
Semiconductors	1
Telecom	1
Diverse	12

Table 11. List of studies by the empirical context.¹⁷

4.1.5 Academic sources

The analysis of academic sources suggests that the primary roots of the review questions lie in the fields of management theory and management accounting. This is

¹⁷ Studies that were not performed within any specific organisational contexts (i.e., studies based on literature reviews, abstract models, simulations, etc.) were excluded from the list.

not surprising, given the fact that the review questions focus on using measurement as an instrument for organisational change. The majority of the sources were published in top quality journals:

Journal	Total
Management Science	5
Organization Science	5
Strategic Management Journal	4
Accounting, Organizations, and Society	3
Management Accounting Research	2
Administrative Science Quarterly	2
European Accounting Review	2
Industrial and Corporate Change	2
Journal of Management Studies	2
Journal of Product Innovation Management	2
Academy of Management Journal	1
American Journal of Sociology	1
Academy of Management Review	1
American Sociological Review	1
Computational and Mathematical Organization Theory	1
Entrepreneurship & Regional Development	1
Evaluation and Program Planning	1
Health Services Research	1
International Journal of Innovation Management	1
International Journal of Operations & Production Management	1
International Public Management Journal	1
Journal of General Management	1
Journal of Health Organization and Management	1
Journal of Workplace Learning	1
Long Range Planning	1
Management Decision	1
Public Performance and Management Review	1
The Quality Management Journal	1
Research Policy	1
Strategy & Leadership	1
Technovation	1
The Learning Organization	1

Table 12. List of studies by the source.

4.2 Thematic Findings

This section presents the major themes encountered in the studies included in the systematic review. It is organised by the sub-questions that were driving the systematic review and concludes with a brief summary.

4.2.1 RQ1 – measures of organisational routines

The information extracted for the sub-question RQ1 included the measurable dimension proposed in the sources and the actual measure that allowed the dimension to be evaluated:

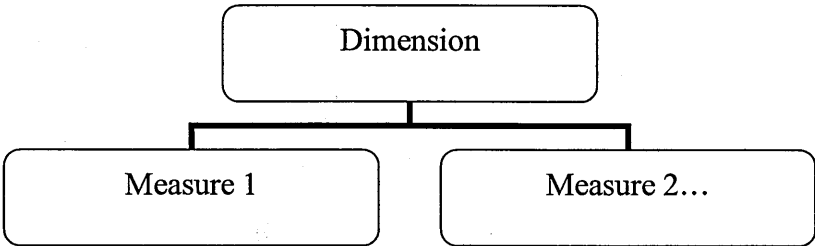


Figure 4. Structure of information extracted for RQ1

It needs to be noted that, in line with the review questions determined in chapter 2, measures were understood in the broadest sense and included both traditional metrics and broader ways of operationalisation of various dimensions of organisational routines. The complete table of identified dimensions and corresponding measures organised by the source appears in Appendix A.

The initial list of measurable dimensions of organisational routines extracted from the literature contained 29 items. However, as it was mentioned in Chapter 2, the research on organisational routines is in its relatively early stage, and even the definition of the concept is still a subject of debates. The operationalisation of the concept, although already addressed in the literature (e.g., Becker, 2005b; Becker et al., 2005), is even less advanced. Thus, as expected, the proposed measurable dimensions extracted from the literature often overlapped or addressed nearly identical issues using different terminology. Therefore, the measured dimensions were organized into 5 groups in order to produce a meaningful discussion. The grouping was based on the aspect of the concept of the routine that the measured dimension reflected. Table 13 reflects the groupings.

Group	Measured dimension	Citation
Attributes	Complexity	(Levitt et al., 1999)
	Flexibility	(Howard-Grenville, 2005)
	Rate of decay (?)	(Cohen and Bacdayan, 1994)
	Occasional suboptimality	(Cohen and Bacdayan, 1994)
	Persistence	(Gossart, 2005) (Howard-Grenville, 2005) (Miner, 1991)
	Reliability	(Cohen and Bacdayan, 1994)
	Stickiness (lack of transferability)	(Szulanski, 1996)
Change	Adaptation	(Massini et al., 2002)
	Change	(Akgun et al., 2006) (Barley, 1986) (Feldman, 2000)
	Evolution	(Knott, 2001)
	Sequential variety	(Pentland, 2003a)
	Variability	(Pentland, 2003a) (Pentland, 2003b)
	Variety	(Massini et al., 2002)
Context	Aspects of power and control	(Braithwaite, 2004)
	Context dependence	(Gossart, 2005)
	Embeddedness	(Howard-Grenville, 2005)
	Interdependence strength	(Levitt et al., 1999)
	Degree of embeddedness (?)	(Braithwaite, 2004) (Feldman and Rafaeli, 2002)
	Standardisation	(Pluye et al., 2004)
	Localisation	(Cohendet and Llerena, 2003)
Nature	Generic vs Idiosyncratic	(Howard-Grenville, 2005) (Tranfield et al., 2003)
	Repeated Action Sequences	(Cohen and Bacdayan, 1994)
	Representation of action	(Gossart, 2005)
	Routinness	(Massini et al., 2002)
	Time Orientation	(Braithwaite, 2004)
Process	Frequency	(Becker, 2005) (Knott, 2001)
	Repetitiveness	(Becker, 2005)
	Selection	(Massini et al., 2002)
	Similarity	(Abbott and Hrycak, 1990) (Becker, 2005)
	Speed	(Cohen and Bacdayan, 1994)

Table 13. List of measurable dimensions organised into groups¹⁸.

4.2.1.1 Change

Various items related to change were grouped into the *Change* category. The discussion of change occupies a prominent place in the research on organisational routines (Feldman and Pentland, 2003; Becker, 2005; Becker et al., 2005). It is crucial for

¹⁸ Some studies suggested metrics without specifying the dimension that was measured. In those cases, the dimension was named by the author and was marked as “(?)”.

understanding routines as the mechanism enabling organisational change. The concept of routines, while certainly acknowledging variation, emerged primarily as an instrument explaining continuity, stability, and repetitiveness (Cyert and March, 1963; Nelson and Winter, 1982). However, it is adaptation or mutation that makes routines central to the understanding of organisational development. Becker et al. (2005) note that routines "...are fundamental to understanding change partly because they provide a basic definition of what change "really is" at the organisational level" (pg. 776). The hierarchy of routines mentioned earlier also means that certain routines are specifically designed to alter other – operational – routines. These could be the learning routines (Tranfield et al., 2000), new product development routines (Becker et al., 2005), or dynamic capabilities (Winter, 2003). This is why significant effort is spent in an attempt to understand and operationalise change in organisational routines.

Change in routines can be understood by analysing it internally – more in line with understanding and description than with quantitative measurement. Martha Feldman (2000) argues that the source of change in organisational routines lies in the interaction of the agents, and thus agency is critical to conceptualising routines as stable but flexible patterns of action. Routines change as the result of "...people doing things, reflecting on what they are doing, and doing different things (or doing the same thing differently) as a result of the reflection" (pg. 625). Thus both the performative and the ostensive aspects of the routines evolve¹⁹. Change in this case is measured by the amount of effort spent on altering a particular routine and operationalised through the reasons underlying change. Feldman introduces the terms *repairing*, *expanding*, and *striving* to describe the type and the intensity of effort involved in updating the routine. Repairing refers to the incremental change aiming to "repair" the existing routine so that it results in the intended and desired outcome; expanding refers to increasing the scope of the existing routine to incorporate new variables in the external environment; and striving describes the continuous change of the routine until its execution reaches the ideal level.

¹⁹ Feldman likens this loop to Argyris' (1976) discussion of single-loop and double-loop learning and draws parallels to Nonaka and Takeuchi's (1995) concept of knowledge creation.

While the deep analytical conceptualisation of change is illuminating, the majority of the studies attempted to measure change in routines “externally”. In other words, they observed certain characteristics of routines at different points in time and drew conclusions regarding the change in the routine based on the change in such characteristics. Some of the proxies are fairly basic – for instance, the degree of routiness established by means of a survey questionnaire, a routiness score assigned on the basis of observations, or simply the revisions in the operating manual (where the rules recorded in the manual are taken as a proxy for the higher-order organising routine). Barley’s (1986) study of change in hospital practices was one of the first attempts to measure routines²⁰, and the proxy in his case was the frequency of occurrence of a specific script of an interaction pattern. These proxies are then observed over time and the change in them is interpreted as modification, *adaptation*, *variety*, or *evolution*.

Other techniques of measuring change – or, more precisely, *variability* – have been borrowed from sociology and natural sciences. Brian Pentland (2003a,b) suggests using the concept of sequential variety, which is borrowed from sociology and based on a technique developed by geneticists. *Sequential variety* analyzes series of iterations of the same pattern. Pentland (2003a) also proposes the ways of operationalising sequential variety itself: through algorithmic complexity, by measuring average distance between iterations, and by measuring the difference between the actual and the statistically predicted pattern of activity. The degree of change that the patterns incur is then easily quantifiable. This is an example of a “nested” measure: while variability is measured by sequential variety, sequential variety is operationalised through mathematical measures of differences in patterns. It is worth noting, however, that in the organisational routines literature this technique has remained primarily theoretical.

4.2.1.2 Context

Another group of dimensions that was found – perhaps surprisingly – to be considerably explored in the literature was related to the issue of embeddedness of routines into the

²⁰ Barley does not specifically talk about routines in this study. However, it is widely referenced as an early example of the analysis of routines; the term he uses is “recurrent interaction patterns” which is virtually identical to the modern definition of a routine.

fabric of organisational processes. Embeddedness or context-dependence is one of the major issues in the organisational routines research. Routines, as was mentioned before, are patterns of actions or cognitive regularities, and therefore, they cannot exist in a vacuum – they need supporting structures, agents, or artifacts in order to be translated into specific actions. Becker (2004) notes that “such an idea is consistent with the notion that general rules and procedures have to be incompletely specified when transferred across context, precisely *because* contexts are different” (pg. 651) [italics original]. Several implications follow this conclusion. First, by themselves rules are empty and cannot be independently translated into action (e.g., Reynaud, 2005). Second, as Feldman (2000) demonstrated, the role of agents is crucial in materialising and changing routines. Finally, as Becker (2004) notes, the differences in context create significant differences in routines.

A whole array of various measurable dimensions fell under the *Context* category. It ranged from fairly well-established concepts, such as *context-dependence* and *embeddedness* to more detailed and less frequent characteristics related to this issue. The literature suggests that context-dependence and embeddedness can be measured by the extent to which routines involve or are dependent upon structures and processes that are external to them. It can also be operationalised as the strength of the external regulation that prescribes certain actions or – in a more complex way – by specifying the impact of routines in terms of the number and type of organisational structures implicated by the routines and the alignment between the impact of the routines and the cultural artifacts.

Standardisation is a dimension that can be operationalised in a similar way: by measuring the degree to which a routine is integrated into (is similar to) institutional or regulatory standards. A similar measure which was suggested was a measure of the *interdependence strength* in a simulation study and was operationalised as the sum of the activity complexities shared by two activities in the system.

An interesting and widely quoted way of operationalising the context of a routine is Cohendet and Llerena’s (2003) notion of routine *localisation*. They argue that routines

are formed at different levels of the organisation in hierarchical communities. By determining (“measuring”) the prevailing characteristics of the community in which a routine was shaped it is possible to understand various characteristics of routines (cognitive, co-ordinating, and motivational). It is also interesting to note that, similar to the reasoning outlined earlier in this dissertation, they extend the analysis to dynamic capabilities, viewing them as higher-order routines.

Closely connected to the issue of context-dependence is the question of the *power of control*. Although no specific metrics were suggested by the literature, the aspects of the power of control were operationalised as the (degree of) control of resources and their allocation that a routine allows. This is one of the closest proxies for the organisational impact of routines.

Finally, several measures were suggested that reflected the *degree of embeddedness* (although in two papers the dimension itself was not explicitly stated). In qualitative studies, this dimension was measured by the number and structure of connections that a routine produces, implicating agents and structures throughout the iterations²¹.

Overall, the findings suggest that context-dependence seems to be one of the most actively researched and most well-operationalised aspects of organisational routines. This probably reflects the crucial role that context-dependence plays in understanding and managing routines.

4.2.1.3 Process

The processual nature of routines is one of the most important characteristics that enable them to be successfully applied in the field of organisational change. Becker (2004) notes that almost by definition routines are a unit of analysis that is processual in nature, which is why “...they provide a ‘window’ to the drivers underlying change, enabling us to observe change in more detail” (pg. 649). As was noted in Chapter 2, it is the understanding of routines as processes that underpins the argument that drives the

²¹ In Feldman and Rafaeli (2002), this also included the shared understanding that a routine produced.

present inquiry. It is the processual aspect of routines that allows them to be the instrument of organisational change.

Of all possible measures of the processual nature of routines, *frequency* has probably received the greatest attention (Becker, 2004)²². However, the literature suggests that frequency itself can be a measure of *repetitiveness*, which is one of the definitional characteristics of routines (Becker, 2005). And while repetitiveness is measured by frequency, frequency in turn can be measured. The metrics encountered in the process of the systematic review included two opposite approaches to measuring – by observation (counting the number of times the same pattern occurs) and by relying on self-reporting (a survey item). Thus, it is another example of a “nested” measure, where repetitiveness can be operationalised through frequency, and frequency has its own metrics.

Related to the measures of frequency (i.e., “how often”) is the measure of *speed* (i.e., “how fast”). The metric for the speed of routines was proposed by Cohen and Bacdayan (1994) in their famous experiment and was operationalised as the time used for executing a step in the routine. Speed is also a markedly process-oriented dimension.

As Nelson and Winter (1982) suggested, routines are selected based on their adaptability to the competitive pressures. The process of *selection* through iteration was operationalised in the literature as the change in the structure of the sample of firms over time. Massini et al. (2002) proposed that the sample could be broken into groups based on the degree of routineness; in which case, a change in the group composition over time would indicate the selection of dominant organisational routines.

The *similarity* of iterations in the process of selection echoes the earlier discussion of the measures of variability, as the measures include sequential variety and the optimal string matching technique. Abbott and Hryack’s (1990) work on career development does not specifically mention routines; however, it is often referred to in the routines literature as being one of the first studies to apply the string matching technique to the

²² Frequency here means the frequency of execution of a routine.

analysis of similarity of action patterns. The optimal matching algorithm they propose measures the “distance” between patterns in terms of insertion, deletion, and substitution of activities. Becker (2005) suggests measuring similarity using Pentland’s (2003a,b) notion of sequential variety, which was mentioned before and which, to a certain extent, incorporates the string matching technique. However, it is not exactly a “nested” measure similar to the one discussed earlier, as Abbot and Hryack’s (1990) study measured similarity directly by the algorithm, without deferring to the concept of sequential variety.

Overall, the evidence suggests that the processual aspect of routines has received considerable attention and certain metrics have been developed to operationalise it. As in the case with the measures of context-dependence, this probably reflects the importance of understanding this aspect of routines.

4.2.1.4 Nature

The nature of organisational routines is still debated. Earlier discussions of definitions and levels of conceptualisation of the term illustrate the variety of viewpoints that exist in the routines literature. Becker (2005) made an attempt to clarify the concept of routines by deconstructing its definition and proposing three conceptual levels of understanding of organisational routines. Part of the challenge lies in the ways of operationalising the frameworks and ideas suggested by theorists.

The measures of the nature of routines are not “measures” in the strictest sense of the word – they are not quantitative metrics. Rather, they are indicators that allow certain dimensions of organisational routines to be operationalised and estimated. They were included in the final pool of sources because the RQ1 was specifically set up to capture “measurement” in its widest sense.

The issue of distinguishing the ostensive and the performative aspects of organisational routines comes up again in the process of understanding the nature of routines. In some papers, it is measured directly – as the *degree of representation of action*²³, where the

²³ I.e., the ostensive aspect of organisational routines.

degree of routininess, operationalised as the presence of physical artifacts, language forms and routine technologies, serves as a measure of the dimension. Other papers view this issue as the *dichotomy between generic* (abstract) *and idiosyncratic* (actual) routines. The measures also vary. Tranfield et al. (2003b), for instance, propose the “grammars of action”²⁴ approach to understanding organisational routines, and therefore “measure” generic routines by observing the key verbs in their context that appear frequently in their subjects’ narratives. These verbs are then used to construct the generic routine that reflects a process. This dimension also appears in Howard-Grenville’s work (2005), but no specific measures are proposed.

Routininess was one of the interesting dimensions that appeared in the literature, as it was essentially the dimension that was aimed at determining whether a process could be called a routine. The corresponding metric that was proposed in the literature was the score based on the survey item that reflected changes in the structures and procedures that related to formal execution of the tasks. The existence of such structures and procedures was interpreted as a high degree of routininess.

Other indicators included in the literature that allowed researchers to “get a handle” on the concept of routines were *repeated action sequences* and *time orientation*. Repeated action sequences were similar to the routininess dimension in the sense that they reflected the basic nature of routines – the presence of recurrent patterns of actions. This dimension was developed in an experimental setting and operationalised as the formed “chunks” of steps within the action pattern that were repeated over time. Time orientation, on the other hand, was aimed at understanding the more subtle nature of routines and was operationalised through analysing the transcripts of subjects’ understanding of the time orientation of their action patterns, producing a past-present-future typology of routines.

Although understanding the nature of routines is critical for analysing change, evidence indicates that the steps made in that directions remain relatively small. This can

²⁴ For this interesting approach to understanding organisational routines, see Pentland and Rueter (1994).

probably be attributed to the lack of clarity regarding the overall concept of routines that is reflected in the ongoing debates on this topic in the literature.

4.2.1.5 Attributes

The understanding of the attributes of organisational routines is necessary for applying them in the empirical work involving change. If the processual characteristics explain the mechanics of routines, their attributes help to understand their impact.

A number of measures related to routines' attributes were found through the systematic review. *Flexibility and persistence* are the flip sides of the same dimension, which refers to the stability and strength of routines. In Howard-Grenville (2005), it was operationalised as the differences/similarities in actors' intentions and orientations and the divergence/alignment between the artifacts²⁵ and expectations. The idea here is that while generic routines exist, the variance in the actual behaviour – the flexibility of the routine – will depend on the aforementioned factors.

Miner (1991) understands persistence of the routine (or rather the lack of it) by measuring the hazard rate for “job death” of a formalised job. In her work, a formalised job is an example of a complex organisational routine. In other studies, the persistence of the routine was “measured” by an external proxy – for instance, the intensity of the routine-specific activity (i.e., data collection for an information-intensive routine).

A number of attributes were developed in experimental settings. *Complexity*, for instance, is proposed to be measured by the number of variables that need to be considered simultaneously by one activity during the process of executing a routine. *Reliability* is measured by the decrease in routine variation over time. *Occasional suboptimality*, which is a flipside of reducing the demand on cognitive processes, is measured as the correlation of the number of uses of recurrent sequence of steps with the average performance of the routine. If the correlation is high, it means that relying on routines prevents the actors from producing the optimal solution in each iteration.

²⁵ Artifacts here are codified norms, plans, and other documents. They represent the performative aspect of the routine.

The same experimental setting produced a metric for the dimension that could be described as the *rate of decay* of the routines. The measure analysed the relationship of routine speed to the delay between two consecutive instances of executing the routine and thus reflected how fast the routine would “decay”.

Finally, an interesting dimension was proposed by Szulanski (1996). He suggested measuring the *stickiness* (lack of transferability) of certain practices, and the metric he suggested was the score based on the questionnaire that measured processes and outcomes of transfer of best practices. Although his work does not specifically address routines, it concerns practices and thus has been referred to as operationalising routines.

There is substantial evidence of the work on operationalising the attributes of the organisational routines. The spectrum of attributes, for which measures have been suggested, includes diverse dimensions of routines.

4.2.1.6 Action or representation?

It is interesting to note that in the majority of the reviewed sources, routines for which some measures were developed were understood on the level of action. In other words, it was the performative aspect of organisational routines that allowed the greatest degree of operationalisation. Table 14 illustrates this point. On one hand, it is not surprising, considering that what is easier to observe is easier to measure, and behaviour is easier to observe than agents’ mental models. However, it does highlight the paucity of research into the operationalisation of the cognitive or ostensive aspect of organisational routines.

4.2.2 “Talking” about routines

The literature on organisational routines is replete with dimensions that reflect certain aspects of routines without, however, suggesting specific metrics to evaluate the proposed dimension. Such “measureless” dimensions are probably the result of researchers’ attempts to get a grip on the elusive concept of the organisational routine. These dimensions have their use, as they stimulate the discussion and prompt empirical work. However, they cannot be called fully operational. Therefore, the sources in which

Action/Representation	Citation
Action	(Abbott and Hrycak, 1990) (Akgun et al., 2006) (Barley, 1986) (Becker, 2005) (Braithwaite, 2004) (Cohen and Bacdayan, 1994) (Feldman, 2000) (Howard-Grenville, 2005) (Knott, 2001) (Levitt et al., 1999) (Massini et al., 2002) (Miner, 1991) (Pentland, 2003a) (Pentland, 2003b) (Pluye et al., 2004) (Tranfield et al., 2003)
Both	(Cohendet and Llerena, 2003) (Feldman and Rafaeli, 2002) (Gossart, 2005) (Szulanski, 1996)

Table 14. Levels of conceptualisation of routines in RQ1.

they appeared were marked as “insufficiently relevant” and were not included in the final pool of sources for the systematic review. Nonetheless, they are closely related to the discussion of measures and may soon be operationalised. In a way, they provide the context for the findings of the RQ1 and thus deserve to be mentioned. Among these dimensions are *interruption*, *decay* (regression), *type of change* (incremental or in leaps) (Weick, 1990); *rigidity* and *functional fixedness* (Dickson, 1992); *disruption* (Edmondson et al., 2001); *degree of habituation* (Pitt, 2005) and *stability* (Feldman, 2003). A number of dimensions are suggested by Becker (2004) in his review of literature – *speed of decay*, *age dependence*, *necessary maintenance*, *time lags*, etc. However, most of these dimensions were linked to the concept of routines for the first time in his review, whereas the original literature discussed related concepts or did not specifically name the dimensions²⁶. Nonetheless, through Becker’s (2004) work, these dimensions are also becoming a way of “talking” about routines.

²⁶ For instance, March (1994) discusses *time lags* not in relation to routines, but to the general evolution process. Likewise, Warglien (1995) discusses *age dependence* in relation to projects, not to the general concept of organisational routines.

4.2.3 RQ2 – learning through measurement

The sub-question RQ2 asked whether feedback produced by performance measurement was used to drive learning through changes in organisational routines. The results of the pilot searches indicated that no sources addressed this question in its entirety. Therefore, the issue was decomposed and its components considered in different combinations.²⁷ The discussion that follows is organised around the major themes from the sources identified through these searches and included in the systematic review.

4.2.3.1 Learning as changes in organisational routines

The literature suggested that organisational learning could indeed be understood in terms of organisational routines. In line with Nelson and Winter (1982) and Cyert and March (1963), routines can be viewed as processes that enable the organisation to function and attain its objectives. A change in routines therefore represents learning, as the organisation adapts its processes to respond to the changes in its environment. Routines, it was suggested, perform a coordinating function, linking individual and organisational learning (Hoeve and Nieuwenhuis, 2006) and are the best concept to understand how the coordination between the different levels of learning takes place.

Some studies shed light on the dynamics of organisational learning through routines. Feldman (2000) emphasises the importance of agency in the development of new routines. As mentioned earlier, in her longitudinal study of the operations of a university housing department, she finds that routines change both on the cognitive or ostensive level – as agents reflect on their experience – and on the behavioural or performative level – as new models of behaviour are tried in practice. It is this continuous loop²⁸ between the ostensive and the performative aspects of routines that drives organisational learning. The link between individual and organisational learning is indeed accomplished through the connecting property of routines. In a later paper, Becker (2005) notes that none of these two aspects is superior to each other, as both of them are necessary for the continuous evolution of the routine. This loop is the most important model of the understanding of the dynamics of organisational learning through routines.

²⁷ See Chapter 3 for details.

²⁸ “Spiral” is probably a better word in this context, as the routines *evolve* with each iteration.

Interesting in this respect is the study which models organisational learning as creation of new routines (Huberman, 2001). Its results suggest that if the new routines are created faster than the decision rules are updated, the system's performance improvement rate decreases. This raises the question of keeping the balance between the cognitive and the behavioural aspects of routines, of matching the learning of new mental models and new patterns of behaviour.

Learning, conceptualised as changes in organisational routines, also allows firms to tackle the problems caused by the path-dependent nature of routines. Path-dependence means that organisational learning depends on the organisation's history, and new information is evaluated and incorporated to the extent to which the current set of routines allows it. While this enables organisations to perform efficiently and create unique capabilities, it can also lead to the entrenchment of a defective skill (Levitt and March, 1988) or to organisational rigidity (Leonard-Barton, 1992).

This is supported by empirical studies. Michael and Palandjian (2004) find that as experience with product introduction grows, new initiatives become less successful. Likewise, Freel (1998) finds that learning through routines may lead to overspecialisation. As Hoeve and Nieuwenhuis (2006) note, routines will persist until challenged. The rigidities or competence traps caused by routines can be overcome when systems, skills, and values are challenged pro-actively with the emphasis on continuous learning (Levitt and March, 1988; Leonard-Barton, 1992). Such an approach might involve determining the routines that inhibit learning and instituting countervailing learning-enabling routines (Tranfield et al., 2000).

4.2.3.2 Learning as a consequence of measurement

As the narrative review suggested, the connection between learning and measurement lies in using performance feedback to challenge strategic assumptions or in using measurement interactively to lead emergent strategic learning. The literature in the systematic review extends these views by suggesting that stimulating learning may be one of the primary functions of measurement – even if not accomplished specifically through the use of performance feedback.

A number of empirical papers, which included rich qualitative studies (e.g., Johansson et al., 2001a; Askim, 2004; Vaivio, 2004) and cross-sectional analyses (e.g., Chenhall, 2005) suggested that performance measurement accomplishes its objectives by generating organisational learning. Measurement gives rise to organisational learning indirectly – by stimulating horizontal and vertical debates during which tacit organisational processes surface and become explicit. This effect is most pronounced when measurement is directed at resources and processes that are inherently difficult to quantify. Vaivio (2004), reporting on the process of using non-financial measures, notes that the latter focus on causes rather than consequences of actions and are objective representations of subjectively perceived processes. This means that they provoke debates during which learning takes place. Thus, he suggests, non-financial measures can be used to trigger localised learning selectively. Likewise, Mouritsen (1998) and Johansson et al. (2001a,b) note that the primary benefit of measuring intangibles lies not in the estimation of their value, but in the process of uncovering value drivers through localised search triggered by measurement.

This relationship is not unidirectional, of course. Learning in turn influences the process of measurement. There is evidence that the changes in routines which are caused by the measurement-fuelled debates become codified in the organisational structures and thus become a part of the organising routine (De Loo, 2006). When understood as a change in routines, learning affects the very instruments of measurement that prompted it in the first place. Kloot (1997) reports that management control systems create the learning environment within which they themselves undergo changes which become part of new structures and systems. This is echoed in Kaplan and Norton's (1996b) notion of strategic learning which is characterised by the deliberate renewal of the control system (the balanced scorecard in this case) based on the results of measurement. Thus, learning becomes the force driving the constant updates of measurement systems.

The effects described above depend on the ways measurement is used. Learning takes place if specifically aimed for by the agents using the control systems. A recent study (Lehr and Rice, 2005) reports that even in organisations with a measurement culture, there are gaps in the use of measures, lack of alignment in the understanding of the roles

and functions of performance measurement, and limited evidence of double-loop learning. Likewise, De Loo (2006) points out that in order to achieve the desired objective, learning programmes need to be used as a part of the overall management control activity. These points raise the question of the factors that are necessary not only for triggering, but also for sustaining and managing the ongoing learning that constitutes the renewal of measurement systems.

4.2.3.3 Learning from feedback

As discussed before, in the behavioural and evolutionary theories, feedback is critical for organisational change. Performance feedback is essentially a communication device that allows agents (or organisations) to evaluate the adequacy of their response to the external environment and, if necessary, trigger a search for new solutions. The question in this dissertation was then to understand to what extent performance feedback could be used to drive changes in organisational routines.

The systematic review results that illuminate this question fall into two categories – a discussion of the interaction between performance feedback and routinised behaviour, and the insight that the studies of management control system provide into the possibility of using performance feedback strategically.

The evidence strongly suggests that the effect of performance feedback on organisational behaviour is mediated by the organisation's past experience. Greve (1998, 2002) finds that, in line with the predictions of the behavioural theory, learning may demonstrate itself both through changes in behaviour and through the adjustment of the aspiration level. In both cases, learning depends on the historical (i.e., evolved through path-dependent iterations) aspiration level. Greve's (2002) findings support the idea that routines can result in a beneficial organisational capability. In his study, in highly uncertain environments, firms that adjust their aspiration level in response to feedback more slowly tend to perform better – an effect that Greve attributes to the fact that slow adjusters place more weight on decision rules that had been proven to be most effective rather than react to the fluctuations in the environment. In this case, the decision rules can be viewed as historically evolved routines.

Other studies agree that changes in behaviour are induced not only by performance feedback, but also by the historical performance incorporated into the aspiration level²⁹. In fact, aspiration level is the most important variable in explaining the behaviour, because it serves as an anchor point, against which the feedback is judged. It seems that in the organisational setting, aspiration level is very similar to a routine, as, according to Lant (1992), it is characterised by a path-dependent evolution through iterations, where changes are caused primarily by past experience rather than by the expectations of future performance. In this case, what the above evidence suggests is that both the evolved decision rules (routines) and performance feedback determine organisational performance.

The literature identified through the systematic review offers further evidence of this relationship. In a large cross-sectional study of acquisitions in the banking industry, Haleblian et al. (2006) find that both historically evolved routines and performance feedback have an impact on organisational behaviour. Moreover, these factors interact, and while firms do persist in routines, the latter are not immutable – in fact, they are sensitive to performance feedback. This relationship is echoed in a qualitative study of clinical practice guidelines (Hysong et al., 2005), which finds that while there is a wide variability of existing mental models among clinical staff, facilities that report higher performance have *both* a clear mental model of operations³⁰ *and* a tendency to use performance feedback as a learning opportunity.

Thus, the literature suggests that the effect of performance feedback is mediated by an equally strong effect of the organisation's past experience. In fact, it is this past experience – demonstrated in aspiration levels, decision rules, mental models, etc. – that provides the context necessary for feedback to be evaluated.

The discussion of management control systems provides an insight into the role of feedback in achieving the intended outcome and the possibility of managing performance feedback strategically.

²⁹ There is also some reference that the performance of a reference group contributes to the formation of the aspirational level (Greve, 2002; Mezias et al., 2002).

³⁰ This can be seen as a high-order routine in its ostensive aspect.

In an early study of management control systems, Flamholz and Das (1987) note that control systems have four core components – planning, measurement, feedback and rewards. While planning by definition precedes action, feedback and rewards have an ex post function – that is, they are triggered after an action is taken. Measurement, however, has a dual role – it works ex ante in its behavioural guise and ex post as an information provider. In its behavioural role, measurement can focus attention on critical areas before decisions are made and actions are taken. It helps to shape the goals towards which the performance will be geared³¹. Schreyogg and Steinmann (1987) extend this idea, suggesting that proactive or ex ante functions of control systems provide *feedforward*, allowing the organisation to analyse *potential* threats to its business model. Thus, while feedback has a reactive function, reporting the results of an action, feedforward affects behaviour before the action is taken.

Other studies agree with this conclusion. Morgan (1992), for instance, agrees that feedforward control is preventive rather than remedial and therefore can be used to focus attention to anticipate and lead change. Likewise, Preble (1992) notes that strategic control systems need a feedforward mechanism, which is an autonomous management function and which allows input sensing and steering decisions.

The most well-known and widely-cited model that builds on these conjectures and is empirically validated is Simons' (1994) model of levers of control. Simons finds that control systems can be used as communication devices to guide both intended and emergent change. His diagnostic and belief systems essentially espouse the feedforward approach to measurement and are used primarily for unlearning the existing systems and structures. Interactive control systems, on the other hand, use the feedforward function of measurement to allow preventive actions and thus stimulate focused learning.

Muralidharan (1997) reviews various approaches to management control systems and concludes that they could be divided into systems for managing strategy implementation and systems for managing the content of strategy. The former are essentially identical to

³¹ These are very similar to what the behavioural theory calls *aspirations*.

the traditional (e.g., Anthony, 1965) definitions of management control. The latter category on the other hand comprised the learning-oriented management control systems, including the models of interactive control, assumption-challenging, strategic issues management, and periodic strategy review. In other words, the learning-generating aspect of control allows strategy development along with implementation.

The management control systems literature lends an insight into using measurement strategically – to guide the process of strategy execution. Management control systems allow both for the strict execution of an existing strategy and for developing the content of strategy. The former is achieved through feedback, while the feedforward function of measurement appears to be the instrument of the latter. All models of the control of strategy content are based on the notion of learning.

4.3 Summary of findings

The systematic review of literature was designed to reflect two approaches to driving strategy execution through changes in organisational routines. On one hand, the necessary routines can be modified or replaced, in which case the need to be identified and operationalised. The literature reviewed for RQ1 indicated that although a number of measures of organisational routines have been proposed, there is still considerable confusion as to their nature and application. Measures were grouped into five categories, and it was found that most attention in the literature was devoted to the measures of change in routines, measures of their context-dependence, and measures of their processual characteristics. One of the most interesting findings (although probably expected) was that the majority of measures were related to the behavioural (performative) aspect of organisational routines.

Routines can also be changed “organically” – through learning that emerges in response to performance feedback. The literature reviewed for the RQ2 indicated that learning could indeed be conceptualised as a change in organisational routines and managed through managing routines. A critical model of learning through routines involved iterations between the ostensive and the performative aspects. Learning was also found to be responsive to the process of performance measurement, where the latter stimulated

learning by fuelling horizontal and vertical debates about organisational structures and processes. However, this effect was observed only when measurement was used properly, i.e., with an aim of generating a learning environment. On the macro-level, learning was driven through performance feedback, which was evaluated against the historically evolved aspiration level. On the micro-level, however, it was the preventive feedforward function of measurement that was found to be associated with organisational learning.

The studies included in the systematic review were carried out primarily in the United States and United Kingdom and published in the top journals in management theory and management accounting. The studies were performed in a wide variety of organisational settings, encompassing public and private sectors. They studies included both empirical and theoretical papers, and employed both qualitative and quantitative research methods.

5 Discussion and Synthesis

5.1 Review Questions Answered

The findings from the systematic review provide the evidence that is necessary to answer the review questions formulated in chapter 2 and advance the research project to the next stage. The overarching area of interest that drives this research is the ways in which performance measurement can be used to drive the process of strategy execution. The narrative review of literature indicated two general approaches to accomplishing this task – using measures to challenge strategic assumptions and modify them if necessary, and using measures as feedback-generating device which can drive the evolution of organisational routines. The review questions were set up to reflect these approaches.

The analysis of the results of the systematic review for RQ1 suggests that a number of metrics for organisational routines have been proposed; however, no unifying framework has been developed. Moreover, although the metrics extracted from the literature reflect various characteristics and dimensions of routines, the majority of them are vague and highly context-dependent. These indicators range from highly descriptive (such as “the resources a routine controls”) to highly technical and developed in experimental studies (e.g., “the number of variables implicated by a routine”) Although these measures provide an insight into the important characteristics of routines, they are aimed primarily at understanding and “materialising” the somewhat nebulous concept of the routine rather than at making routines “actionable”. This probably reflects the lack of agreement and the ongoing debates that exist in the literature. Thus, it seems that using these indicators in the manner implied by RQ1 is hardly possible at this stage.

The measures will need to be organised and refined in order to be useful for the task of purposefully changing the strategy in an empirical setting. This dissertation made a step towards the organisation of the existing measures, proposing a rough typology which categorised the measures into five groups:

- Measures of change in routines,

- Measures of routines' context-dependence,
- Measures of routines as processes,
- Measures of routines' nature,
- Measures of routines' attributes.

A very important point is the fact that the majority of measures found in the literature were related to the behavioural (or performative) aspect of routines. On one hand, this should be expected, as behaviour is easily observable. On the other hand, if learning takes place through iterations between the ostensive and the performative aspects of routines, the lack of measures addressing the former aspect is worrying. Concentrating on measurement of one aspect at the expense of the other is hardly useful; and, given the dynamic nature of the process, may influence its development in an undesirable direction.

The general answer to the RQ2 was negative, as no evidence of using performance measurement for facilitating learning through routines was found. However, the analysis of the evidence found through examining the component parts of the sub-question suggests that performance measurement could indeed be applied to organisational routines with the aim of generating learning. Thus, the literature confirms the proposition made in the narrative review concerning the use of performance measurement as an instrument of strategy execution. However, it also suggests several clarifications.

First, the literature expanded the understanding of the role of performance measurement in enacting change. It is not only the feedback-generating function of measures channelled into routines that triggers learning. The process of measurement itself intensifies the learning process by surfacing tacit knowledge and stimulating debates that lead to changes in routines, including the measurement routines.

Second, the discussion of management control systems contributed to the clarification of the use of the term *feedback* in the narrative review. The general term that should be used with respect to measurement is *communication*, which in turn can be divided into

feedback and feedforward, depending on the way measurement is used. The former takes place *ex post* and is an important part of the assumption-challenging model of control. The latter is preventive and proactive, establishing priorities and increasing the range of input information before the action is executed. Both are crucial for learning.

Third, it was convincingly demonstrated by the research in the field of behavioural theory that changes in behaviour are determined not only by performance feedback, but also by the historically evolved capabilities and constraints of the organisation. Performance is first interpreted vis-à-vis the aspiration level, and is then followed by the action – either a change in behaviour or an adjustment in the aspiration level. Thus, it is not feedback *or* routines; it is feedback *and* routines that determine organisational change.

5.2 The Integrative Framework

The results of the review received under RQ1 and RQ2 need to be synthesised in order to produce the basis for further research in the proposed research area. The remainder of this section discusses a framework that ties together various lines of the argument developed in this dissertation and paves the way for the identification of the avenues for further research.

The framework which integrates the findings of the systematic review into a coherent picture is reflected in Figure 5. Given that the details of the findings have been analysed earlier, the discussion that follows is intended to clarify the logical connection between the concepts that make up the proposed framework.

Organisational learning takes place when performance feedback received from the firm's external environment indicates a disparity between the performance produced by the current actions and the acceptable level of performance. As Lant (1992) states, this gap – the attainment discrepancy – “serves as a simple, clear signal which decision makers use to guide their behavior” (pg. 642). The ensuing change is what behavioural theory calls *learning*, and it demonstrates itself through a change in behaviour or through an adjustment in the aspiration level. Both behaviour and the aspiration level

can be conceptualised in terms of organisational routines – either their performative (patterns of interaction) or ostensive (cognitive models) expression.

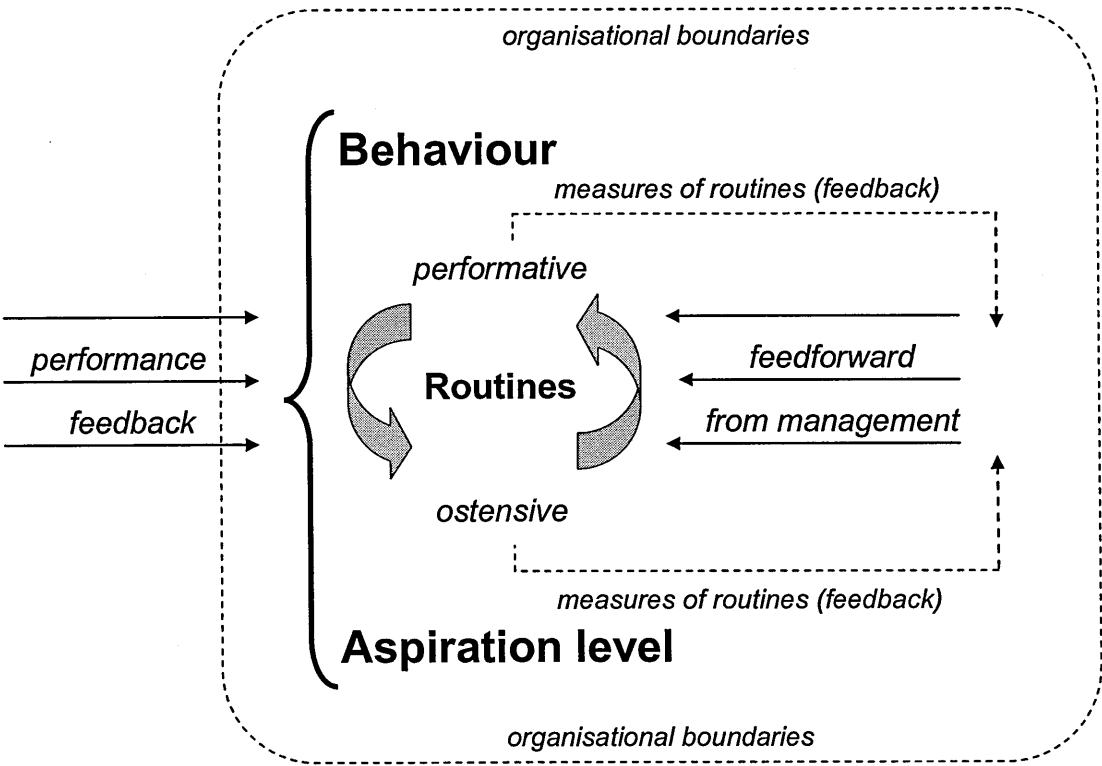


Figure 5. An integrative framework developed on the basis of findings of the systematic review.

Learning takes place through changes in routines, and the literature identified in the systematic review helps to understand the mechanics of this process. Routines evolve through iterations between action and reflection, between the performative and the ostensive dimensions. As agents change their perception of routines and modify the ways in which they carry them out, routines undergo change, which constitutes organisational learning. Performance feedback indicating an attainment discrepancy is thus the environmental trigger stimulating the execution and the modification of routines³². Through the evolution of routines the attainment discrepancy is “closed”.

As the literature has shown, learning can be intensified by performance measurement. The process of measurement forces tacit knowledge on the surface and stimulates debates which lead to changes in behaviour and/or structures, i.e., to learning. In a way,

³² This is consistent with the notion of feedback-react decision rules discussed in Chapter 2.

the discussions aimed at making tacit knowledge explicit, which appeared in the literature on non-financial measures and intangibles, correspond to the circle between the cognitive and performative aspects of routines.

However, performance measurement can achieve this effect only when it is designed and used for learning purposes. The management control systems literature suggests that localised learning can be driven through the feedforward function of measurement; that is, through preventive and learning-oriented measurement. By using feedforward selectively, learning can be guided, and its direction, influenced (hence the localised nature of learning emphasised by the management control systems scholars).

Organisational routines are complex sets of processes. The set of indicators discussed in section 4.2.1 help to identify the nature and the magnitude of changes in the routines as they evolve. These measures are used *ex post* and thus act in their informational role or, in other words, as feedback for management. In this role, they inform the latter's actions, allowing them to validate their assumptions regarding the changes in routines and to be aware of the details of the change process.

This framework integrates the findings from the literature to suggest a coherent answer to the review questions set earlier. It also provides an insight into the *micro*-processes that underlie the questions raised by the management control systems and performance measurement scholars mentioned earlier. Viewing constantly evolving routines as central to the learning-through-measurement process may extend Hofstede's (1978) insights regarding the political and local nature of management control, advance the modern PM scholars' view of PM systems as complex and evolving entities, and illuminate the debates in strategic management literature concerning the balance between strategy implementation and evolution.

6 Conclusions

6.1 What We Know: Conclusions of the Review

The systematic review reported in this dissertation has helped to clarify a number of points in terms of the overall research interest that drove this inquiry. The overarching research issue was the use of performance measurement as an instrument of driving strategy execution. Two review questions reflected the two major approaches to this task – using measures to validate assumptions and inform subsequent intervention and using measures to stimulate localised organisational learning.

The analysis of the literature reviewed under the first review question identified a number of indicators that were proposed for measuring organisational routines. However, the nature, diversity, and the degree of operationalisation of these metrics indicate that at this stage, measuring routines to inform subsequent intervention can hardly be used as a stand-alone method of driving strategy execution. An attempt was made to classify the identified metrics in order to make their analysis more meaningful.

The analysis of the literature reviewed under the second review question indicated that routines can indeed be the vehicle of strategy execution when the change in their structure is conceptualised as organisational learning. It was also demonstrated that the feedforward function of measurement can be used for intensifying the process of learning through routines and guiding localised learning in the desired strategic direction. However, this approach lacked a discussion of the feedback mechanism.

A framework was suggested to synthesise the identified evidence into a coherent picture of using performance measurement to drive strategy execution. Figure 5 is a visual representation of this framework.

6.1.1 Limitations

The findings of this review are subject to certain limitations. The major one stems from the nature of the core concepts underlying the discussion. Organisational routines,

organisational learning, performance measurement, etc. are terms that lack clear definitions. That makes full synthesis difficult if not impossible. A common perspective or at least a common language is necessary to see the unity of contradictions, which lies at the heart of synthesis. Since such a perspective does not yet exist, the conclusions presented here reflect the author's interpretation of the main concepts.

Another limitation is caused by the intentionally narrow focus of this review. Since the reviewed concepts lack clear definitions, are open to interpretation, and lie at the intersection of diverse fields, trying to capture all of their aspects in a set of search strings leads to an unmanageable number of sources. Bringing it down to a reasonable number inevitably reduces the breadth of the perspective. To the extent that was possible, this dilemma was mitigated by consulting the panel of experts at the planning and design stages. Nonetheless, the findings discussed above are limited by the definitions and perspectives adopted by the author during the review process.

6.2 Reflections and Learning Points

A systematic review is a relatively extensive project and the review that became the basis of this dissertation was the author's first experience with the process. The learning points resulting from this experience can be organised into those relating to the content and to the process of project.

6.2.1 Content

The systematic review highlighted the difficulty of dealing with an area of research which is interdisciplinary in nature. Working with definitions that describe different aspects of the same concept in different language called for substantial "inductive" thinking, and demonstrated the difficulty of maintaining rigour in working with rich and diverse literature. Maintaining a record of the thought process proved to be a very helpful skill.

Juxtaposing and synthesising the results of qualitative and quantitative studies was also an interesting learning experience as it provided an insight into the process of operationalising concepts, of moving from abstract descriptions to concrete and

observable proxies. Again, the issue of rigour seemed to be very relevant, as it was clear how shaky assumptions underlying the choice of variables lead to meaningless results.

6.2.2 Process

A number of learning points were related to the process of the systematic review. The most important one concerned the selection of appropriate studies. The search and selection processes in this review were perhaps unnecessarily long and complicated. Over 2,000 abstracts across databases were reviewed to come up with only 51 studies included in the final pool of sources. This was probably the result of the strategy which called for very broad search strings. However, this process could have been designed more efficiently: if the field is vague and cross-disciplinary (as the fields referred to in this dissertation are), it may be better to start with very specific search strings and achieve the necessary breadth and interdisciplinary insight later through cross-referencing and panel recommendations. Otherwise, many studies that address the issue vaguely have to be reviewed and later discarded as irrelevant.

Another learning point related to the process of the systematic review was the enormous benefit provided by keeping an accurate and meticulous record of the data extraction process. The output, when organised well, is extremely helpful in considering the results and concepts in different combinations and supporting the synthesis process. This is a skill that will be developed and will definitely be taken forward.

6.3 What We Do Not Know: Implications for Further Research

A number of questions remain unanswered and can potentially become the basis for the doctoral research that will follow this study. These questions appear below:

First, if measurement is known to intensify the process of learning through routines that closes the gap between the observed behaviour and the aspiration level, can it be used to influence which effect will prevail? In other words, can managers use the feedforward effect of measurement to influence the choice between adjusting the aspiration level (the goals and plans) and changing behaviour? Answering this question would produce a serious contribution to the manager-centred view of strategy.

Related to this is the second question – can performance measurement be used to bridge the cognitive and the evolutionary approaches to strategy? If performance measurement – again, in its feedforward function – can be used to guide organisational learning while still being based on the managers' mental model of the desired strategy, what is the dynamics of keeping this balance? This question puts the inquiry in the middle of the modern debates in strategy (Gavetti and Levinthal, 2000; 2004; Gavetti, 2005) and helps to bridge the two approaches to using performance measurement.

Another question is, how can the set of available measures of organisational routines be classified, improved, expanded and made operational? Well-designed measures of routines can give an unparalleled insight into the organisation, as the latter is nothing but a set of interlocking routines. A contribution in this area can potentially advance the fields of measurement, intangibles, organisational change and strategy.

In terms of Huber's (1991) classification of organisational learning processes, the framework presented in this dissertation reflects primarily the knowledge acquisition component of learning³³. Strategy execution, however, entails much more than simply acquiring the right knowledge. Therefore, it would be interesting to see the role and dynamics of performance measurement in terms of the other components of organisational learning – the distribution and interpretation of information and the use of organisational memory. Understanding performance measurement in terms of the various effects on learning that it produces would make a significant contribution to the modern debates in the PM field.

Finally, all of the proposed logical relationships need to be empirically checked – either tested and refuted or observed and developed. Do managers act based on the measures of the routines? How responsive are different routines to the effect of feedback? What is the effect of the organisational context? How do measurement systems or control systems evolve during the process of learning-centred measurement? All of these questions need thorough empirical work, and all of them can potentially become the research question of a doctoral study.

³³ However, by virtue of employing routines as the central construct the framework covers all of this component's subprocesses.

The research area that drove the inquiry presented in this dissertation lies at the intersection of diverse and vibrant fields of management knowledge. As a result, it has a rich potential for formulating a research study which is theoretically sound, methodologically possible and practically relevant.

Appendices

Appendix A

Papers included for sub-question RQ1³⁴

Citation	Journal	Objective	C/E	Measured dimension	Proposed measures	Group
(Abbott and Hrycak, 1990)	AJS	To develop a technique for the direct measurement of career resemblance	E	Similarity	Optimal matching algorithm measuring distance between sequences in terms of the insertions, deletions, and substitutions	Process
(Akgun et al., 2006)	JPIM	To empirically test the antecedents and consequences of unlearning to enhance the literature on NPD team learning process and cognition	E	Change	Change in procedures, plans, tools, and information-sharing mechanisms reported in Survey (Likert scale)	Change
(Barley, 1986)	ASQ	To outline a theory of how technology might occasion different organisational structures by altering roles and patterns of interaction.	E	Change	Change in frequency of occurrence of specific scripts over time, where a script is a record of a recurrent interaction pattern	Change
(Becker, 2005)	ICC	To develop a framework for applying the concept of org routines in empirical research	C	Frequency Repetitiveness Similarity	Measure of how often the "same" interaction pattern (measured by Pentland's (2003) sequential variety) has been repeated in one time period Frequency Sequential variety (Pentland's definition(2003))	Process Process Process
(Braithwaite, 2004)	JHOM	To redress the imbalance between prescriptive and descriptive approaches in studying routines; to provide a descriptive-analytic picture of behavioral routines	E	Aspects of power and control Not stated	Control of resources and their allocation Connections a routine produces; "sociogrammatic depiction" of relationships	Context Context
				Time Orientation	Past, Present, Future	Nature

³⁴ The C/E column reflects whether the paper is a conceptual or an empirical study. The acronyms of the journal titles are explained on page 45.

Citation	Journal	Objective	C/E	Measured dimension	Proposed measures	Group
(Cohen and Bacdayan, 1994)	OS	To unlock the dynamics of organisational routines and the ways they arise and change.	E	Not stated	Relationship of routine speed to the delay between repeating the routine	Attributes
				Occasional suboptimality	Correlation of the number of uses of recurrent sequence of steps with routine's average performance	Attributes
				Reliability	Decrease in variation (between identical routines) over time	Attributes
				Repeated Action Sequences	Formed "chunks" of steps within the action pattern that are repeated over time	Nature
(Cohendet and Llerena, 2003)	ICC	To contribute to clarifying the concept of routines by focusing on the question of localisation of routines	C	Speed	Time used for executing a step in the routine	Process
				Localisation	Hierarchical community (functional or autonomous)	Context
				Not stated	Connections a routine produces	Context
				Change	Shared understanding a routine produces	Context
(Feldman and Rafaeli, 2002)	JMS	To expand the understanding of the notion of routines	C	Not stated	Repairing, Expanding, Striving	Change
(Feldman, 2000)	OS	To expand the understanding of the notion of routines	E	Context dependence	"Degree of Routininess" score operationalised as the strength of external regulation of actions	Context
(Gossart, 2005)	Technovation	To explore the differences in the ways oil refineries manage Health, Safety, and Environmental issues	E	Persistence	"Degree of Routininess" score operationalised as the extent of data collection and usage	Attributes
				Representation of action	"Degree of Routininess" score operationalised as presence of physical artifacts, language forms, and routine technologies	Nature
				Embeddedness	Technological structures (number of structures implicated); Coordination structures (type of structures implicated); Cultural Structures (alignment between artifacts and expectations of implicated structures)	Context
(Howard-Grenville, 2005)	OS	To build a theory of the persistence and change in flexible task-oriented routines	E	Flexibility	Actors' intentions; Actors' orientations; Artifacts and expectations	Attributes
				Generic vs Idiosyncratic	None	Nature
				Persistence	Actors' intentions; Actors' orientations; Artifacts and expectations	Attributes

Citation	Journal	Objective	C/E	Measured dimension	Proposed measures	Group
(Knott, 2001)	MS	To test the strong-form dual-routines view of managerial value against the organisation theory view that managers are superfluous	E	Evolution	Magnitude and frequency of revisions in the operations manual (for the franchisee)	Change
				Frequency	Survey item asking "how often the practice was executed" for 7 selected practices	Process
(Levitt et al., 1999)	MS	To extend the application of Virtual Design Team simulation to account for goal incongruity between agents and bridge the micro and macro views on organisation theory.	E	Complexity	Number of variables that must be considered simultaneously in one activity when solving a problem	Attributes
				Interdependence strength	Sum of the strengths (i.e., requirement complexities) for all requirements shared by two activities	Context
				Adaptation	Change in the frequency distribution of the routiness score over time	Change
				Routiness	Score based on questionnaire measuring changes in structure or procedures	Nature
(Massini et al., 2002)	RP	To explore adoption and adaptation of new structural and procedural org routines	E	Selection	Change in the structure of the sample (based on routiness score) over time	Process
				Variety	Coefficient of variation of the routiness score	Change
(Miner, 1991)	ASR	To examine empirical patterns in the survival of formalised jobs as org routines; to consider whether external factors affect routines	E	Persistence	Hazard rate for "job death"	Attributes
(Pentland, 2003a)	MS	To introduce a measure of variability in organisational work processes	C	Sequential variety	Algorithmic complexity	Change
				Variability	Average distance	Change
					Deviation from uniform random Markov	Change
					Sequential variety	Change
(Pentland, 2003b)	OS	To answer the questions of whether a work process is performed the same way every time and how the variability can be measured	E	Variability	Sequential variety (comparison of sequences to each other; comparison of sequences to a null model)	Change

Citation	Journal	Objective	C/E	Measured dimension	Proposed measures	Group
(Pluye et al., 2004)	EPP	To re-conceptualise the structural and temporal dimension of sustainability	C	Standardisation	Integration into institutional standards; constrained by a state-level rule or policy	Context
(Szulanski, 1996)	SMJ	To advance the understanding of the impediments to capabilities transfer within the firm	E	Stickiness (lack of transferability)	Score based on questionnaire measuring process and outcomes of transfer of best practices	Attributes
(Tranfield et al., 2003)	IJIM	To develop a process model for knowledge management routines in the context of innovation projects	E	Generic vs Idiosyncratic	Significant verbs in their context (in line with Pentland and Rueter (1994)	Nature

Papers included for sub-question RQ2³⁵

Source	Journal	Citation	Objective	C/E	Findings
DB	IPMJ	(Askim, 2004)	To contribute to clarifying the role of performance measurement in org learning	E	Management control was facilitated by the BSC. Provocative measures prompted horiz and vert debates and stimulated learning. Although MC took different forms, the learning behaviour was similar. All units looked for feedback and way of incorporating it. Learning behavior was demonstrated even in areas that were vague and hard to measure.
DB	AOS	(Chenhall, 2005)	To clarify the role of the informational dimension of strategic PMS in achieving org outcomes	E	The information dimension of strategic PMS has 3 components - link btw strategy and OPS, customer orientation, supplier orientation. The effects of 1st and 2nd on strategic outcome are mediated (fully in case of the 2nd) by the extent of organisational learning. PMS provides vision and feedback necessary for learning. Specifically BSC is not a sufficiently strong indicator predicting integrative information effect.
DB	TLO	(De Loo, 2006)	To highlight the relevance of management control in action learning programs that aim to foster org learning	E	Action learning programmes become effective if used as a part of the overall management control activity. In that case, "interactive" (after Simons) control measures fostered debates and led to new routines codified in the Handbook.
PR	AOS	(Flamholtz and Das, 1985)	To provide the nucleus for developing an integrative theory of organisational control	C	A model of org control is proposed, which consists of the core (planning, measurement, feedback, and rewards) and the context (ext environment, structure, culture, etc.) The focus of control is on human systems. Planning is ex ante; feedback and rewards are ex post. Measurement has a dual role: ex post in informational role, ex ante in behavioural role. Beh: focuses attention on critical areas, defines criteria which become goals or constraints towards which behavior is geared, affects (forms) perceptions.
DB	IJOPM	(Forza and Salvador, 2000)	To determine the basic characteristics with which an effective performance feedback information should comply	E	7 requirements for feedback were proposed and found to be distinct. 5 were found to affect performance: relevance in terms of achievement of objectives; timelines of shop-floor performance info; feedback on the overall process performance; relevance as usefulness of non-cost data (for managers); personal feedback (for managers). No link to performance of a) relevance in terms of cost performance; b) dynamic adjustment.

³⁵ The Source column reflects the source of the study – database searches (DB), panel recommendation (PR), or cross-referencing (CR).

Source	Journal	Citation	Objective	C/E	Findings
DB	ERD	(Freel, 1998)	To contribute to the development of a process theory of learning	E	Learning can be conceptualised in terms of changes in org routines. Unlike operational routines, modification and investment routines are harder to separate, they overlap. Dichotomy between internal and external search is overly simplistic, each one has elements of the other. Supports the evolutionary theory: learning may lead to overspecialisation. Learning is not continuous - probably a series of discrete jumps.
DB	ASQ	(Greve, 1998)	To examine how performance feedback affects the probability of risky organisational changes that are consequential to an organisation's performance	E	As predicted by behavioral theory, behavior changes in response to feedback. However, it is mediated by historical and social aspirational level, and the learning is more sensitive above aspirational level.
DB	OS	(Greve, 2002)	To understand the dynamics of change in org-1 aspiration levels	E	Aspirational level changes but with different speed. Slow adjustment leads to higher performance. High environmental uncertainty leads to better performance of slow adjusters since they place more weight on the "proven" decisions rather than reacting to random fluctuation in time and reference group. Slow adjusters survive longer. Validated empirically.
DB	AMJ	(Haleblian et al., 2006)	To understand the interaction and the combined effect of routine usage and learning from feedback on org behaviour	E	Both routines and performance feedback have an impact on behaviour. These predictors interact - the positive effect of experience is greater when accompanied by stronger performance. Firms adjust behaviour in view of prior experiences. There is a joint effect - while firms do persist in routines, these routines appear to be sensitive to performance feedback.
DB	JWL	(Hoeve and Nieuwenhuis, 2006)	To understand the phenomenon of learning at different levels of org-n using the concept of the routine	E	Routines are the best concept that helps to understand the coordination between different levels of learning. Routines connect individual learning to the collective I. and further to organ-I. Have an interlocking structure. Change in routines = collective learning process = innovation. Routines apply until challenged.
DB	CMOT	(Huberman, 2001)	To expand the understanding of organisational learning by developing a dynamical theory that accounts for the introduction of new routines and for improved selection	C	Learning can be described by the addition of shortcuts between activities in the form of links (routines) and by improvement in the decision procedure. It explains anomalies: increasing costs of output (dim. returns) occur when the introduction of new shortcuts takes place at a faster rate than the improvements in the decision procedures.

Source	Journal	Citation	Objective	C/E	Findings
DB	HSR	(Hysong et al., 2005)	To present the differences in mental models of clinical practice guidelines among 15 veteran health administration facilities in the US	E	Wide variability in mental models of clinical practice guidance. High-performing facilities have BOTH a clear shared mental model AND a tendency to use performance feedback as a learning opportunity.
DB	EAR	(Johansson et al., 2001a)	How do firms try to enhance their understanding of value creation by measuring intangibles?	E	A typology of measuring intangibles for learning is developed based on the existence and strength of the "measuring for learning" search rule and the strength of the supporting meas-t routines. Measurement concerns both strategy dev-t and info management. Provides feedback for learning. Simple classification was of no interest to firms; the interest is in making tacit understanding of value drivers explicit.
DB	AOS	(Johansson et al., 2001b)	To contribute to the understanding of how the management control of intangibles is accomplished	E	In the cases, it was not the objective measures, but the attention directing benefit of measurement that was of interest for the companies. In the most advanced form, measurement comprised several subroutines that encouraged change and learning.
DB	S&L	(Kaplan and Norton, 1996)	To illustrate the role of strategic learning in BSC	C	BSC is designed to act as an instrument for strategic learning by using strategic feedback to allow managers to question assumptions about strategy (dbl-loop learning). Allows both for hierarchical and emergent strategy.
DB	MAR	(Kloot, 1997)	To illustrate the links between management control and org learning.	E	In the face of a change in the environment, the organisation that used control systems (costing and reporting) was able to create a better learning environment than the one that didn't. Learning was reflected in changes in: environmental scanning, performance reviews, training, org structure, participative decision making. Learning is dependent on BOTH design AND use of MCS. Relationship is bidirectional: MSC stimulates learning which results in new structures and systems.
DB	MS	(Lant, 1992)	To extend the understanding of aspiration formation in organisations	E	Aspirational level formation is path-dependent (changes are caused by past experience, not expectations); over time, such adaptive learning leads to behaviour consistent with rationality; aspirations are responsive to discrepancies btwn goals and performance; attainment discrepancy sends a clear, simple, and actionable signal for learning; behavioural changes are not always incremental, and aspiration formation has an optimistic bias
DB	QMJ	(Lehr and Rice, 2005)	To understand how org measures are used	E	Perceptions of measures are favorable but differ by position (managers have less trust) and function. Employees clearly spend more energy on the measured elements. However, despite measurement intensity, there are gaps in use, variety in understandings, and limited evidence of dbl-loop learning. Some support for Huber's (1991) notion that org learns even though not all people learn.

Source	Journal	Citation	Objective	C/E	Findings
PR	SMJ	(Leonard-Barton, 1992)	To extend the understanding of capabilities	E	Capabilities have a dysfunctional flip side - rigidity that hampers adaptive change. Reason: entrenched value systems. Can be changed by challenging systems, skills, and values with emphasis on org learning
DB	PPMR	(Mausolff, 2004)	To deepen our understanding of feedback and learning processes in non-profit organisations	E	The proces of learning from performance feedback has 4 disting stages: identifying, integrating, searching, implementing. The sequence depends on where in the process a theory of action was developed. Some support to the thory of stress as a necessary factor, but not in all orgs. Interpretation is a part of each stage: Identifying - focus on perf. data; Integrating - on others' interpretation; Searching - on info from search; Implementing - detailed experiential feedback. Supports satisfying hypothesis.
DB	MS	(Mezias et al., 2002)	To extend the research on the role of aspiration levels in organisational learning processes	E	Supports Cyert & March's conceptualisation of learning. Previous AL is the most important variable - serves as an anchor point. Behaviour is adapted to performance in a manner consistent with Beh Theory predictions - performance above the AL induces AL to shift upwards and vice versa. Performance feedback model provides the best fit with the data. AL will also be changed to minimise discrepancy with a peer reference group.
DB	JPIM	(Michael and Palandjian, 2004)	To examine how organisations learn from their experience in product introductions	E	As experience grows, new product introductions are less successful. Why? Core rigidity, competency trap or org pressures. Further research needed to isolate effects.
DB	JGM	(Morgan, 1992)	What is the difference between Japanese and British use of control systems? Should it be used as a benchmark?	C	Japanese and British MSCs are different in their use of feedback. Feedforward control is preventive rather than remedial. Use: allows to anticipate rather than react. FB and FF are complementary. FF can be used informally by focusing attention to anticipate and lead change
DB	MAR	(Mouritsen, 1998)	To compare EVA and IC as two technologies of managing oriented towards encouraging growth	C	IC statements as a technology of management is better positioned (than EVA) to develop competencies, indicate ways of improving productivity and of making meaningful interventions. Reason - IC concentrates on relationships and interactions that is repeated over time: the process of value creation. IC "measures" allow for productivity drivers to be uncovered and thus drives localised learning.

Source	Journal	Citation	Objective	C/E	Findings
PR	LRP	(Muralidharan, 1997)	To clarify the concept of strategic control by analysing differences between various approaches to strategic control and by examining whether SC is different from management control	C	Various approaches to strategic control can be grouped into 2 categories: control of strategy implementation and control of strategy content. They differ with respect to the purpose, process, and focus of control. Control of strat impl. is virtually identical to traditional management control. Control of strategy content: combining models of validating assumptions, strat issues management, interactive control, periodic strategy review.
DB	JMS	(Preble, 1992)	To clarify and extend the notion of strategic control	C	For effective strategic management, strategic control needs to incorporate feedforward mechanisms. It is an autonomous mgmt function and is countervailing to planning. It is feedforward in nature. Allows input sensing and steering decisions. Includes strategic surveillance and special alert control; premise control; implementation control.
DB	AMR	(Schreyogg and Steinmann, 1987)	To propose a more relevant alternative to the existing models of strategic control	C	The concept of strategic control answers the question of whether or not the strategic direction should be altered at various stages, from conception to implementation. It does so proactively (based on feedforward) - by analysing potential threats to the existing strategic model. To accomplish this, the control system must adopt a metalevel perspective that is not tied too closely to the established strategy.
DB	SMJ	(Simons, 1991)	To examine whether systematic forces cause top managers to focus their attention on certain control systems in specific strategic settings	E	Management control systems are used as feedback devices to change patterns of behaviour in the firms. Interactive CS are those that managers use personally and frequently to challenge assumptions. Design and choice of ICS depend on strategic uncertainties: tech dependence, complexity in value chain, and speed of retaliation. Choice corresponds to the vision. Usually 1 system is used - reflects learning priorities. Managers are engaged in second-order process.
DB	SMJ	(Simons, 1994)	To understand how and why new managers use formal control systems as a means of implementing strategy	E	MSCs are formal information-based routines used to maintain or alter patterns in org activities; can be used as levers of strategic change. Instrumental in advancing the agenda of new CEOs. Can be an agent of both intended and emergent change. Used both for unlearning (diagnostic and belief systems) and learning (interactive systems). Used as communication devices to achieve buy-in.
DB	MD	(Tranfield et al., 2000)	To clarify the role of org routines in org learning	E	Organisational learning is influenced by a set of defensive and a set of enabling routines. Takes place when the effect of enabling routines exceeds its counterpart.
DB	EAR	(Vaivio, 2004)	To understand the role of non-financial measurement in managing knowledge	E	Non-financial measurement focuses on causes rather than consequences. It is an objective representation of subjectively perceived processes - hence fosters debate, knowledge creation and learning. Managers can use it to trigger local learning in a focused manner. Empirically demonstrates how organisational insight becomes explicit.

Acronyms of journal titles

Acronym	Journal
AJS	American Journal of Sociology
AMJ	Academy of Management Journal
AMR	Academy of Management Review
AOS	Accounting, Organizations, and Society
ASQ	Administrative Science Quarterly
ASR	American Sociological Review
CMOT	Computational and Mathematical Organization Theory
EAR	European Accounting Review
EPP	Evaluation and Program Planning
ERD	Entrepreneurship & Regional Development
HSR	Health Services Research
ICC	Industrial and Corporate Change
IJIM	International Journal of Innovation Management
IJOPM	International Journal of Operations & Production Management
IPMJ	International Public Management Journal
JGM	Journal of General Management
JHOM	Journal of Health Organization and Management
JMS	Journal of Management Studies
JPIM	Journal of Product Innovation Management
JWL	Journal of Workplace Learning
LRP	Long Range Planning
MAR	Management Accounting Research
MD	Management Decision
MS	Management Science
OS	Organization Science
PPMR	Public Performance and Management Review
QMJ	The Quality Management Journal
RP	Research Policy
SL	Strategy & Leadership
SMJ	Strategic Management Journal
Technovation	Technovation
TLO	The Learning Organization

Table 15. The list of acronyms of journal titles used in the review

Appendix B

General/Specialised	Category	Fields
General	Article number	Number
	Source (database, panel, etc.)	Source
	Citation	Author(s)
		Title
		Citation
		Publication Title
		Date
		Volume
		Number
		Month or season
		Page numbers
		Location
	Methodology	Industry
		Empirical/theoretical
		Qualitative/quantitative
		Sample size
		Method of data collection
		Method of data analysis
		Additional characteristics
	Quality assessment	Quality 1
		Quality 2
		Quality 3
		Quality 4
		Average score
	Content	Objective
		Keywords
		Primary literature
		Personal comments
	Inclusion	Include?
		Reasons for exclusion
Specialised	Research Question (1 or 2)	Research Question (1 or 2)
	Measurable dimension	Measurable dimension
	Proposed measure(s) of routines	Proposed measure(s) of routines
	Group (for measures)	Group
	Related to strategy?	Related to strategy?

Table 16. Customised data extraction form.

Appendix C

This appendix contains the list of sources that were considered for inclusion but were not obtained from the British Library in time for the review. They would have been subjected to the same process of selection and quality appraisal as the rest of the sources.

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