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Original Citation

Amaratunga, Dilanthi and Baldry, David (2000) Theory building in facilities management research: case study methodology. In: Case study methodology, January 2000, University of Salford, UK. (Unpublished)

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THEORY BUILDING IN FACILITIES MANAGEMENT RESEARCH: CASE STUDY METHODOLOGY

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ABSTRACT: This paper describes the process of theory building in performance measurement in facilities management through a study of the applications of some core principles of business performance context, and theory verification as it investigates the practical validity of a number of existing general theoretical propositions relating to business performance measurement in facilities management. In this reciprocal way, the present research helps to contribute to expanding the sphere of different disciplines where the theoretical propositions are valid. It further concerns case studies – from specifying the research questions to reaching closure. Some features of the process, such as epistemological foundation and selection of research method are described which are especially appropriate in new topic areas such as performance assessment in facilities management.

Keywords – facilities management, performance measurement, theory building, methodology, case studies

1. BACKGROUND

The aim of this paper is to outline the research strategy pertaining to the study of assessment of facilities management (FM) performance, and to provide justification for the decisions made during the development of the research design. Further, it outlines the epistemological, and methodological characteristics of the research area which have an impact on the research design and describes the objectives developed and the methods used throughout the research project.

Specifically, the research objectives are derived from the gaps in the literature and the research design embraces both qualitative and quantitative methods, the former being the more prevalent and the latter providing statistical support for qualitative findings. This difference, in the context of this research elaborates performance assessment in FM, in the former case, and as performance measurement as a critical success factor in FM organisations, in the latter case.

Several steps in the process of building theory from case study research have appeared in the literature. Yin (1994) has described the design of case study research and defined the case study as a research strategy, developed a typology of case study designs, and described the replication logic, which is essential to multiple case analysis. Miles and Huberman (1984) have outlined specific techniques for analysing qualitative data. Their ideas include a variety of devices such as tabular displays and graphs to manage and present qualitative data without destroying the meaning of the data through intensive coding.

The work of such as Bettenhausen and Murnoghan (1986) on conversion of theory-testing research into theory building research, Denzin (1984) on triangulation of data types, and Eisenhardt (1989) on building theories from case study research, have provided additional pieces for a framework of building theory from case study research.

As a result, many pieces of the theory building process are evident in the literature. Nevertheless, at the same time, there is substantial confusion as to how to use them, combine them, when to conduct this type of study and how to evaluate it, in FM.

2. EPISTEMOLOGICAL FOUNDATION

Like any human action, research is grounded on philosophical perspectives, implicitly or explicitly. Ignoring the philosophical issue, while not necessarily fatal, can seriously affect the quality of research in management science. Understanding the philosophical positioning of research is particularly useful in helping researchers clarify alternative designs and methods for a particular research, and identifying which are more likely to work in practice, according to Easterby-Smith (1991).

2.1 Positivist Vs. Realism Approach

Two distinct philosophical approaches for developing research have been the subject of a long-standing debate in science: the positivist and the realism (interpretative or phenomenological) approach.

The positivist approach, often designated as qualitative research, believes that the subject under analysis should be measured through objective methods rather than being inferred subjectively through sensation, reflection or intuition (Remenyi et al, 1998). Among the major implications of this approach is the need for independence of the observer from the subject being observed, and the need to formulate hypotheses for subsequent verification. Positivism searches for causal explanations and fundamental laws, and generally reduces the whole into simplest possible elements in order to facilitate analysis (Easterby-Smith, 1991 and Remenyi et al, 1998)

The realism approach, also known as interpretative or phenomenological approach, understands reality as holistic, and socially constructed, rather than objectively determined. Susman and Evered (1978) talk of an "epistemological crisis" in management research which has arisen out of the application of the positivist model of science in the social science and hence realism, an approach which arose in the last half of the twentieth century. According to this philosophy, the researcher should not gather facts or simply measure how often certain patterns occur, but rather appreciate the different constructions and meanings people place upon their own experiences and the reasons for these differences. The realism approach tries to understand and explain a phenomenon, rather than search for external cause or fundamental laws (Easterby-Smith, 1991 and Remenyi, 1998)

2.2 The mixed approach

Remenyi et al (1998) argue that both positivism and realism approaches are not totally different in terms of their impact on research, and in the generalisation of findings. Both approaches need a convincing argument that the findings are valid before these findings are accepted as a valuable addition to the body of knowledge. Ultimately, it is more useful to see these two approaches as complementary to each other rather than as two opposite extremes (Remenyi et al, 1998).

The dominant philosophical approach underlying this research is a balance between the positivism and realism approaches. The implications of that may be seen in the way the research questions were formed. Objectives were formulated aimed at identification of empirical evidence to match theoretical propositions. Following the conclusions of Remenyi et al (1998), the world is essentially non-deterministic in any absolute sense and even repeated positivist research will also produce different results, a pure positivist approach therefore could not be adopted to this research.

Further, because understanding the holistic context of FM practice was one intention, realism approach would help to provide the means to interpret practice. Using a pure realism approach, the various different meanings that FM managers gave to the theoretical framework could be studied.

A pure realism approach was not applied, as there was an expectation that, to a certain level, other FM researchers should be able to apply the same research methodology and obtain similar results. This assumption was incompatible with the basic fundamentals of a "pure" realism approach where establishing "different views" is one of the preferred research methods (Santos, 1999). [See table 1, which was edited from Easterby-Smith (1991) to illustrate the principles of the mixed approach applied to the research]

Table 1. Key features of positivist and realism paradigm and the chosen mixed approach

Theme	Positivist paradigm	Realism paradigm
Basic beliefs:	• The world is external and objective • Observer is independent	• The world is socially constructed and subjective • Observer is part of what is observed • Science is driven by human interests
Researcher should:	• Focus on facts • Look for causality and fundamental laws • Formulate hypotheses and test them	• Focus on meanings • Try to understand what is happening • Look at the totality of each situation • Develop ideas through induction from data.
Preferred method in the research:	• Operationalising concepts so that they can be measured	• Using multiple methods to establish different views of the phenomena • Small samples investigated in depth

Therefore, a balanced (mixed) approach seemed to be the best description of the philosophical emphasis adopted in this research. It is true that in its "pure" interpretation, the positivist is different and quite incompatible within the realism approach. However, as Easterby-Smith (1991) states, the apparent incompatibility is blurred and the differences are by no means so clear and distinct when it comes to actual research.

3. THE NATURE OF THE RESEARCH AREA – LITERATURE AND OBJECTIVES

The subject of this research is performance assessment in the FM organisation. The related concept of performance measurement in general has also been reviewed and has opened up some interesting areas for research, which will be visited in the sections 3.3 and 3.4. The main areas of debate that emerged from the literature seemed to centre around two themes: the FM organisation and performance measurement in FM.

3.1 Literature review

The literature review reveals the established and generally accepted facts of the situation being studied, and enables one to identify and understand the theories or models which have been used by previous researchers in the field. The literature review assists the researcher in identifying an unsolved problem in the field being studied and which will become the focus of the research study.

The review of the literature included an in-depth examination of the material relating to performance assessment in general and in FM organisations in particular. The main purpose and outcome of this was to identify theoretical gaps in the literature, which pointed to potential research topics. Although the area of performance measurement is not new, the constructs are neither well established nor standardised across and even within FM disciplines. There are, therefore, an abundance of areas that require further investigation.

3.2 Facilities management context in general

The origins of FM can be traced back to the era of scientific management and the subsequent explosion in office administration in the early 1990s. The move towards better management of facilities is set to continue as buildings with their content and organisations continue to become more sophisticated. Several groups have attempted to define the scope of this role of FM, and some of these relate to particular views from the more traditional professional fields. Definitions of FM abound and to date there has been no one commonly agreed description of what FM entails. This is appropriately defined by the US Library of Congress as: 'the practice of co-ordinating the physical work place with people and work of the organisation integrates the principles of business administration, architecture and the behavioural and engineering sciences.'

This definition is however very broad, whilst inadequate, as a direct basis for constructing a working model for facilities management. Nevertheless it confirms, in general terms the realisation that there are at least three principal aspects to the facilities management function which may be true in every situation (Barrett, 1994):

- it is a supporting management function to the core business of an organisation.
- it concentrates on the area of interface between physical workplace and people.
- it requires a multi-skill approach.

The Centre for FM in the University of Strathclyde (1992) defines FM as 'the process by which an organisation delivers and sustains a quality working environment and delivers quality support services to meet the organisations objectives at best cost'. The working environment includes the physical, administrative and social setting for productive activity and the definition includes all the systems and services that support the business operation and suggests that FM is essentially demand driven and should be closely related to strategic planning in an organisation.

The essence of FM lies in the ways in which facilities are tuned to business needs and in the effectiveness of the systems that ensure non-core activities deliver value for money (CFM,1992).

3.3 Performance evaluation concept

Measurement has always been of great importance. It is an area, which has been discussed increasingly over the past few years, and the adages 'you can't manage what you can't measure' and 'what gets measured gets done' are an all too common element of many

management texts. Sinclaire and Zairi (1995) exemplify the need for measurement in enabling good planning and control; management of change; communication; continuous improvement; resource allocation; motivation; and long-term focus, judging it to be ' a valid management tool'. Thus, the use of measurement as an aid to the promulgation of core values throughout organisations is now common. Neely (1998) identifies commonalties between business strategy, organisational behaviour, and manufacturing communities, noting a consensus that 'strategies are realised through consistency of decision making and action' which may be reinforced by performance tracking methods.

3.4 Performance measurement in practice in facilities management

It has been mentioned earlier, that the context of this study is FM organisations. The criticism has been made that FM researchers do not use the concepts of performance measurement in as rigorous a manner as, for example, business performance theorists. Furthermore, they make no use of more general discussions of performance measures, e.g. the usefulness of constructing a performance measurement framework for FM, and add performance measurement into models of FM processes in the same way that they add project management techniques. The study of performance measurement in a FM setting has therefore been somewhat superficial.

Although the literature on performance measurement is vast, very little of it provides concrete evidence that the concepts are operational in the real world, specifically in disciplines such as FM. A review of literature in FM over recent years indicates a trend towards performance measurement, particularly for strategic development. Furthermore, the FM organisation provides a good setting for the study of performance measurement. A study of FM literature indicates that performance measurement in FM will be perceived in two ways. Firstly, as a 'critical success factor' in the strategic development process and secondly as a learning process within the FM organisation. The latter refers to a process whereby the FM organisation aligns itself with its environment by obtaining information, either from the market place or through the generation of scientific knowledge, and the subsequent applications of this in organisational development processes.

3.5 Literature gap

From the literature review, several gaps in the theory emerged, providing some potential research areas. In general, researchers and writers in the FM field have yet to investigate the concepts of performance measurement which are well developed in other fields nor do they take into account the complexities of performance measurement at the FM organisational level.

The critical observation of practice, allied to a careful reading of the literature, suggested the emergent need to determine, verify and integrate the axioms of modern performance measurement in the context of FM.

3.6 Research objectives

From the pilot study findings (refer section 4.2) and the conclusions of the literature review, the research objectives and strategy are derived. The ultimate goals of this research are based on two main themes of the literature of FM organisation on the one hand, and performance measurement on the other. The aim of performance measurement in FM takes into account the methodological recommendations of Tsang (1997) by trying to obtain productive

accounts of performance measurement in FM intensive organisations from which theory can be built and to provide prescriptive findings from these descriptive accounts.

The aim of the performance measurement themes is to explore the paradox of consensus/diversity and exploration/exploitation in FM organisations and to use the concepts of different perspectives of performance measurement to explain the co-existence of these various types of performance measurement within FM.

4. RESEARCH METHODS

The research methods for this research are developed from the conclusions of the literature review. Table 2 outlines the main phases of the research strategy:-

Table 2. Outline of the research strategy

Research phase	Output
Literature review	Research objectives; a priori constructions and relationships
Pilot study	'operationalibility' of research objectives; case study strategy
Case studies	In-depth and causal explanations of performance measurement in FM organisations
Phase one analysis	Initial qualitative findings; performance measurement tools which form the postal survey questionnaire
Questionnaire survey	Quantitative support for qualitative data
Phase two analysis	In-depth analysis of qualitative and quantitative research and theory building and verification

4.1 Literature review

The review of literature included the examination of the material relating to management and FM in particular, performance measurement, and performance measurement in FM and are briefly described in sections 3.1, 3.2, 3.3 and 3.4.

4.2 Pilot study

The pilot study was undertaken to achieve the following objectives:-
- to understand the context contingencies in FM organisations
- to test the 'operationability' of the objectives and constructs identified in the literature
- to discover the type of activity supported in the pilot organisation which can be regarded as part of its performance measurement process
- to provide the focus for the research project by helping to refine the data collection plans with respect to both the context of data and the procedures to be followed

The pilot case was chosen on the basis that it supported the criteria mentioned above, that is, it was FM intensive. The inquiry for the pilot study was less focused than the ultimate data collection plan. The pilot data provided considerable insight into the basic issues being studied, even though it was done prior to the selection of specific technologies for the final

data collection. In attempting to find a relationship between the level of FM practice and its impact upon performance, the pilot study assumed that performance measurement in FM is basically governed by the user focus, measurement framework, management involvement, communication and tools and techniques. For a fuller description of the pilot study, see Amaratunga and Baldry (1999,2000)

4.2.1 Methodology

Through the interviews with the FM organisation, the study tried to analyse the determinants of performance measurement implementation in FM. In tandem with the determinants of performance implementation factors identified by Neely (1998), Kaplan and Norton (1996) and Barrett (1992), it investigated the relative importance and various other issues raised by the literature review. The most significance ones are the implications of the human resource instruments towards the organisational performance within performance measurement contexts, difficulties encountered and the level of acceptance, and current day practices. The prime purpose of this exercise was to increase the understanding of what exactly has been done in practice on performance measurement issues in FM organisations. Also this ultimately helped to uncover the type of information which will be required to carry out the more comprehensive survey at the next stage of the research.

4.3 Case study research

The nature of the research at this stage meant that intensive research methods were preferred. Hence, the activities of data collection are based on the case studies as the main research strategy in investigating the application of performance measurement in FM. This allowed an in-depth investigation of the concepts of performance measurement in FM in their real life context.

The case study is a research strategy, which focuses on understanding the dynamics present within single settings. Yin (1994) defines case study as an empirical investigation into contemporary phenomenon operating in a real-life context. It is particularly valuable when there is not a clear definition between the phenomenon and the context itself. This definition is highly pertinent since the present research is theory building and theory verification research. In this type of research, data collection has to be carried out in 'real world' conditions where the kind of control present in a laboratory is not feasible and not even ethically justifiable (Yin, 1994, Remenyi et al, 1998 and Miles and Huberman, 1984).

As a working definition, a case study may be characterised as a detailed examination of an event (or series of related events) which the analyst believes exhibits (or exhibit) the operation of some identified general theoretical principle (Mitchell, 1983). A very important advantage of the case material lies in the richness of its detailed understanding of reality. This meant it can work as an effective mnemonic device. Zonabend (1992) states that case study research is done by giving special attention to complexities in observation, reconstruction, and analysis of the cases under study and is done in a way that it incorporates the views of the 'actors' in the case under study.

The need for case study research is supported by epistemological and methodological discussions. That is, there is a need to study performance measurement in its FM organisational context and, more importantly, to uncover the mechanisms through which FM organisations will benefit.

4.3.1 Case study design acceptability

Yin (1994) postulates that any research study, for it to be valid, should conform to, and 'pass' certain design tests with regard to various levels of research validity. Yin (1994) refers to four design tests: -

- construct validity – establishing correct operational measures for the concepts being studied
- internal validity – establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships
- external validity – establishing the domain to which a study's findings can be generalised.
- reliability – demonstrating that the operations of a study - such as the data collection procedures – can be repeated with the same results

The design tests, which this research references, are detailed in table 3, along with those measures implemented to ensure design test acceptability. It can be seen, therefore, that a number of key design checks have been incorporated within the performance of this research in order to best ensure that the research conforms to and repeats good academic practice. In addition, the measures implemented help ensure that the research is also as relevant to the market and practice environment, which it references.

4.3.2 Multiple case studies

Case studies can be single or multiple-case designs, whereas in this study multiple design follows where it shows a replication rather than sampling logic. Yin (1994) points out that generalisation of results, from multiple designs, is made to theory and not to populations. Multiple cases strengthen the results by replicating the pattern matching, thus increasing confidence in the robustness of the theory. Further, the use of multiple cases in this study underlines the complexity of the topic under investigation and develops the empirical evidence to support and sharpen the theory. The approach to the case studies is a theory building and verification rather than testing theory one, as will become apparent.

4.3.2.1 Selection criteria for the case studies

The criteria to select the cases were a matter of discretion and judgement, convenience, access and to be those which were FM sensitive for the purpose of this research, as described by Yin (1994). The emphasis on abstract principles made it unnecessary to consider in the selection criteria organisational characteristics such as the organisational size or type. The level of FM practice was another criteria for choosing the host organisations as it is intended to compare the 'best practices' of the 'best organisations' to ensure fair comparisons.

4.3.2.2 Central case and supporting cases

Of these multiple cases, one is being considered to be the most central to the development of the theory. All the other cases are used to support the findings from the main case. According to the theory development concept of this research, the main case illustrates the best practice. Same data collection procedure is adopted in all cases even though one case is being considered as the central case. The fact that a singular case is being deemed the 'central case'

is because there is more relevant data to uncover during the data collection and is therefore, worthy of more in-depth discussions.

4.3.3 Limitations of case study research

Case study research forms the main part of this research study. Although there are many advantages of this method, there are also many criticisms.

The main criticism of the case study method is that it suffers from a lack of rigour and excess of bias. With case studies, the danger of ad hoc theorising and neglecting to test data become greater. Failing to develop a sufficiently operational set of measures and the use of 'subjective' judgements during data collection stages, usually renders construct validity poor. According to Bromley (1986), researcher bias has an impact on the internal validity of the data. Becker (1986) agrees with this saying that researchers may have 'feelings' for the subjects and conclusions that are drawn suffer from a lack of reliability. A further problem is that of external validity which is very difficult to measure in the case study setting (Berger, 1983). It is impossible to generalise findings to different settings as phenomenon and context are necessarily dependent.

The evidence from multiple case studies, however, is often considered more compelling and the overall study is regarded as more robust. For theoretical generalisability, the important consideration is related to the complexity of external validity, i.e. whether external conditions are thought to produce much variation in the phenomenon being studied.

In the context of this research, perhaps the most critical aspects of the case study approach is the fact that it provides a limited basis for the traditional 'scientific generalisation' (Yin, 1994, Remnyi et al, 1998). Notwithstanding, like all experimental observations, case studies results can be generalised to theoretical propositions (analytical generalisation) but not to populations or universes (statistical generalisation). Thus, the aim of case studies cannot be to infer global findings from a sample to a population, but rather to understand and articulate patterns and linkages of theoretical importance. In support of the above, Santos (1999) has stated that it is important to emphasise that case studies deal with unique situations and, because of that, it is not possible to elaborate detailed and direct comparisons of data.

According to Yin (1994), the quality of any given design can be judged according to the following four, previously mentioned tests: construct validity, internal validity, external validity and reliability. The application of these principles to this research is illustrated in table 3: -

Table 3. Validity and reliability in the case study research[Source: Yin (1994)]

Tests	Case study tactic	Phase of research in which tactic occurs
Construct validity	• Use of multiple sources of evidence • Establish chain of evidence • Have key informants review draft case study report	• Data collection • Data collection • Composition
Internal validity	• Do pattern matching • Do explanation building • Do time-series analysis	• Data analysis • Data analysis • Data analysis
External validity	• Use replication logic in multiple case studies	• Research design
Reliability	• Use case study protocol • Develop case study data base	• Data collection • Data collection

These validity and reliability tests were re-visited in the description of the case study design in section 4.3.1. To overcome limitations in case study research methods, some authors propose the use of combined or multiple methods, e.g. triangulation techniques.

4.3.4 Triangulation

Stake (1995) states that the protocols that are used to ensure accuracy and alternative explanations are called triangulation. The need for triangulation arises from the ethical need to confirm the validity of the processes. Case study is known as a triangulated research strategy and in case studies this could be done by using multiple sources of data (Yin, 1994). The fundamental notion of the triangulation technique is that qualitative and quantitative methods should be viewed as complementary rather than as rival camps (Jick, 1979). Hence, it is the combination of qualitative and quantitative methods in the study of the same phenomenon. Denzin (1984) identifies four types of triangulation: -

- data source triangulation, when the researcher looks for the data to remain the same in different contexts;
- investigator triangulation, when several investigators examine the same phenomenon;
- theory triangulation, when investigators with different view points interpret the same results; and
- methodological triangulation, when one approach is followed by another, to increase confidence in the interpretation.

The origins of triangulation can be found in Campbell and Fiske (1959) (cited in Jick, 1979) who developed the idea of 'multiple operationism'. They argue that more than one method should be used in the validation process to ensure that the variance reflected is that of the trait and not of the methods.

The effectiveness of triangulation rests on the premise that the weaknesses in each single method will be compensated by the counter-balancing strengths of another. That is, it is assumed that multiple and independent measures do not share the same weaknesses or potential bias.

Triangulation or multiple methods were used in this research for two purposes. Firstly, to use quantitative methods to support the findings of the qualitative research and secondly, to use the quantitative findings to uncover formal relationships between the constructs, which will be derived from the qualitative research, thus providing extra impetus to the direction of the qualitative analysis. The specific methods and techniques utilised in the research are described in the next section.

4.4 Data collection

Case study is known as a triangulation strategy (Tellis, 1997a, 1997b and 1997c). The need for triangulation arises from the ethical need to confirm the validity of the process. Triangulation also increases the reliability of data and the process of gathering it (Simon et al, 1996). In multiple cases, triangulation tests the degree of external validity (McCutcheon, 1993). In this study, this is achieved by using multiple sources of data: survey questionnaires, interviews, document analysis, archival records and direct observation, as described by Yin (1994).

4.4.1 Semi-structured interviews

At each of the case study organisation, data is collected primarily through semi-structured interviews. All interviews are taped and transcribed. The individual level data is collected by interviewing employers and other stakeholders. Constituents other than the senior management may be the best source to overcome the potential for bias (Flynn et al, 1994). The interviews at the case study organisations are focused on the activities, processes and outcomes of the performance measurement process. The interviews incorporate the following (table 4): -

Table 4. Case study interview schedule

Unit of information	Information collected on
General information	Parent/core organisation and its vision, mission and business objectives, its organisation structure
FM organisation	Its structure (within the core-business and within the FM organisation itself), the FM processes: background, history, objectives, vision and mission, members, activities, its contribution to the core-business of the organisation
Performance measurement initiatives	History, processes, identification of key processes in performance measurement
Performance measures	Identification of respective performance measures: the services received by the customer, cost efficiency, internal processes, learning and growth issues.
Information management	FM and external influences, potential problems and innovation issues.

4.5 Postal survey research

To reiterate the epistemological discussions in section 2, the merits of quantitative research were mainly attributed to the minimisation of 'observer bias'. Sayer (1984) says that the fundamental difference between quantitative and qualitative research designs are the types of questions being asked. Qualitative research questions are aimed at exploring the causal processes in particular situations and quantitative research on the other hand, is concerned with discovering formal relationships.

For this research, the quantitative research supports the qualitative research, i.e. case study research, which is the more dominant method. Further it indicates formal relationships between the constructs. The findings that emerge from the initial analysis form the basis for the questionnaire at latter stages. Where the objective of the qualitative research in this study is to build theory, the aim of quantitative research is to provide further evidence to support the emergent theory. Furthermore, the findings from the quantitative research indicate relationships in the qualitative data that would have otherwise have gone unnoticed. Again, it is important to note that the quantitative research is not aimed at finding causality, but rather associations amongst the variables, which support the findings in the qualitative data.

5. CASE STUDY STRATEGY AND THEORY BUILDING AND VERIFICATION

Eisenhardt (1989) discusses methods and techniques, which can be used in the design of case study research, including data collection and analysis, specifically to build theory. In a review of literature, which includes authors such as Yin (1989) and Miles and Huberman (1984), Eisenhardt develops a process for building theory from qualitative data, taking into account the problems of validity and reliability. Table 5 illustrates the case study strategy described by Eisenhardt. The table was edited to incorporate an extra column to incorporate the methods, which follow in this research study to describe the activities undertaken to satisfy each criterion. The activities can be regarded as falling into three categories of data design, data collection and data analysis as shown in table 5. Data design and data collection has been briefly described in sections 4.3, 4.3.1, 4.3.2 and 4.4 and data analysis procedure is discussed in the preceding section.

5.1 Analytical strategy

Analysing data is the heart of building theory from case studies, but it is the most difficult and the least codified part of the process (Eisenhardt, 1989).As Miles and Huberman (1984) wrote: ' one cannot ordinarily follow how a researcher got from 3600 pages of field notes to the final conclusions, sprinkled with vivid quotes though they may be.' However, several key features of analysis can be identified.

5.1.1 Within case analysis

The analysis of the multiple case studies is based on the comparisons between the empirical evidence with the theoretical propositions developed at the initial stages of the study and involves detailed case study write-ups for each case. The overall idea is to become intimately familiar with each case as a stand-alone entity. This process allows the unique patterns of each case to emerge before pushing towards generalised patterns across cases. In addition, it gives rich familiarity with each case which, in turn, accelerates cross-case comparisons.

5.1.2 Cross case patterns

The tactics here are driven by the reality that people are poor processors of information (Eisenhardt, 1989). They leap to conclusions based on limited data, overly influenced by the vividness, ignore basic statistical properties or sometimes drop disconfirming evidence. The danger is that a researcher reaches premature and even false conclusion as a result of these information-processing biases. Thus, the key to good cross-case comparison is counteracting these tendencies by looking at the data in many divergent ways. The cross case analysis in the study uses the process that Yin (1994) calls replication logic, or pattern matching, similar to that used in the multiple experiments.

5.2 Forming and testing propositions

There is an agreed definition in the literature that a case study is a 'bounded system' where all facts and measurements are inter connected with each other. Therefore, each individual case study consists of a 'whole' study that has to be able to stand alone in its own right (Yin,

1994) and in the cross-case analysis an explanation building approach is adopted complementary to the pattern matching approach, which is further a formation of propositions. This approach is similar to pattern matching, but the aim is to analyse the data by building an explanation about the case.

The final phase of the theory building process as outlined in Eisenhardt (1989) is that of comparing those propositions developed for each case. At this stage, it is possible to identify the central case which is the strongest in terms of developing theory around the subject areas of performance measurement and FM. The other case studies are compared to the central case to identify which propositions are supported, whether through congruence and improved performance or divergence and lesser performance. The analysis techniques outlined above form an iterative process of proposing and checking statements, that is induction and deduction as described by Turner (1983).

The overall quality of the pattern matching is improved in this research by using statistical quantitative indicators developed for a questionnaire survey as described in section 4.5. Searching for the typical behaviour and practical boundaries of quantitative indicators is the key strategy for increasing the accuracy of pattern matching and explanation building analysis. Additionally non-structured discussions with practitioners and academics, and through a network of contacts, help to refine further the interpretations of theory and practice. This continuous learning process enhances the accuracy of the interpretations, hence increasing the construct validity of the study, as recommended by Yin (1994).

5.3 Theory verification – linking empirical evidence and theory

Tying the emergent theory to existing literature enhances the internal validity, generalisability, and theoretical level of theory building from case study research. After cross case comparisons of the propositions, the emergent theory is compared with the theoretical framework identified at the literature review phase and others which are not included but which emerge as being important during the research. While linking results to the literature is important in most research, it is particularly crucial in theory building research because the findings often rest on a very limited number of cases. In this situation, any further corroboration or internal validity or generalisability is an important improvement.

6. SUMMARY : FROM DESCRIPTIVE TO PRESCRIPTIVE RESEARCH

The epistemological discussion in section 2 concluded that this research does not adhere to any specific philosophical doctrine, and is a combination of positivism and realism in its aims and objectives which are characterised by theory building and theory verification rather than a hypothesis testing process, incorporating the triangulation method of combining qualitative and quantitative research. The research strategy and journey of the research process is conceptualised in figure 1: -
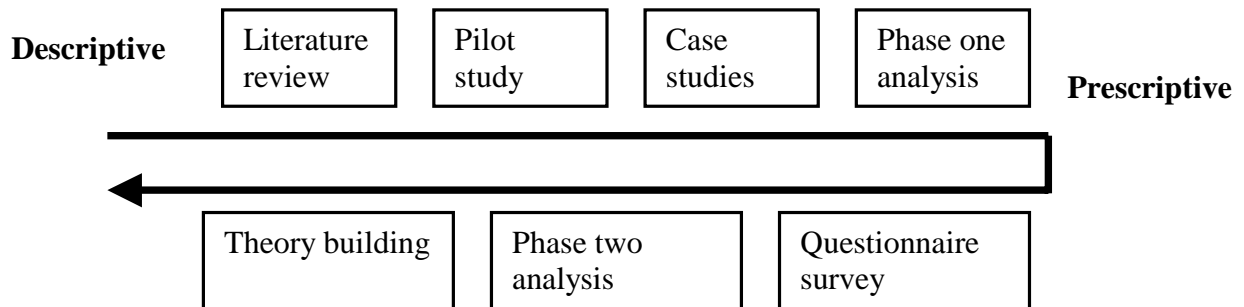
Figure 1. Research Strategy (Source: edited from Pacitti, 1998)

The first stage of research is the literature review phase, which is aimed at identifying potential research topics. Although this marks the beginning of the research, it is a continuous process throughout the research process.

The pilot study is conducted to uncover the operationalisability of the constructs identified in the literature review and to more fully understand the context within which the research takes place.

From the pilot study and literature review the research objectives and case study strategy are developed. The qualitative fieldwork consists of multiple case studies. The analysis of the qualitative data is conducted in two stages: the first stage uncovers the main performance measurement tools used by the case study organisations and these tools form the basis for the questionnaire survey. The second stage consists of the iterative analysis of the qualitative data using proposition forming techniques, and of the quantitative data using statistical techniques. The statistical findings indicates relationships in the qualitative data (if any) that may otherwise have gone unnoticed.

The stages of the research outlined in this paper present a methodology which embraces both prescriptive and descriptive research. The literature phase of the research marked the beginning of the descriptive research. As the case studies progress and the performance measurement tools emerge from the initial analyses, there is a definite move along the descriptive-prescriptive spectrum. The tools also provide the foundation for the questionnaire survey. The second phase of the analysis involves an iterative investigation of qualitative and quantitative data, which encompass the theory building process. Hence, the output of the research will end where it began, at the descriptive end of the spectrum.

7. ACKNOWLEDGEMENTS

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