Advanced Research Methods in the Built Environment
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This book sets out to complement the more standard research methods textbooks available, by broadening and deepening the treatment given. A range of very experienced researchers thus provide perspectives on a wide variety of research paradigms, but there are also contributions concerning the ‘nitty gritty’ of research practice. This is all delivered solidly within the context of built environment research.

Together the contributions provide a wealth of wisdom and insights for the postgraduate researcher, or indeed the ambitious undergraduate or curious established researcher.

The diversity of the subjects covered is an indication of the complexity of the built environment research domain. The quality of the material is a very positive measure of the level of maturity that this research discipline has now reached.

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President of the CIB (International Council for Research and Innovation in Building and Construction)
Introduction

The built environment is a diverse field attracting a wide variety of researchers approaching their object of study from different disciplinary and methodological perspectives. For a new researcher, this diversity can add both interest and challenge to the practice of research. Many research questions, which reside in the built environment, may require investigation using the theories and methodological tools from disciplines such as art, economics, law, philosophy, sociology and statistics, to name just a few. However, many built environment researchers have been academically trained in professional areas; for example, architecture, construction management, engineering or surveying. Even though most of these degrees require the undertaking of research projects to some extent, and many include tuition in subjects such as applied statistics and economics, the principal focus of curriculum is preparation for professional practice. As such, a transition to postgraduate research work (and beyond) can be bewildering for the student. The principal aim of this book is to provide a bridge between the introductory research methods books typically used at undergraduate level and the many discipline-specific texts, which can be difficult to access for the non-specialist.

In a book of this nature, it would be impossible to comprehensively cover all areas of interest to researchers in the built environment. Instead, our aim has been to provide a text covering a variety of topics which typically concern new researchers. The selection of topics has been informed through consultation with the specialist chapter authors, all of whom have years of experience as both researchers and supervisors. Topics range from pragmatic issues surrounding the production of a thesis or journal article, to chapters considering the role of theory or epistemology in research. Our intention is that each chapter is the start of a journey, allowing readers an opportunity to develop a familiarity with an area before deciding whether to progress to more specialised texts.

Although the primary audience for this book is the postgraduate, enthusiastic undergraduates will also find various chapters interest. Additionally, owing to the diversity of our field, academics will also find some of the specialist chapters useful. Therefore, this is not the sort of book to be formulaically read cover to cover. It is essentially a resource book covering a wide variety of issues ranging from the philosophical to the purely practical. Hence, to some degree, we feel the necessary constraint of the concise book title may be too narrow to do justice to its broad content.

Like choosing a title, the order and subjects of the chapters posed another challenge. Ultimately, we believed that sectioning the book into various chapter groups would provide a false impression of clear subject divisions. For example, many chapters touch on data collection as well as broader methodological issues. However, there is a logic to the order. We start with broad subject areas of enquiry, before turning to more generic concerns. The book then moves into examples of some very specific methods before the final part focuses on more pragmatic issues. A brief overview and discussion of some of the connectivity and complementarity between the chapters is provided below.
Chapter One opens the book by calling for methodological pluralism and, as such, provides a useful starting point. Dainty argues that, despite philosophical debates in the field of construction management in the 1990s, there has been reluctance on the part of researchers to fully embrace alternatives to the dominant quantitative paradigm. Drawing on an analysis of the methods used for papers published in one of the leading journals, it appears that the construction management research community is still firmly rooted in the positivist tradition. The chapter concludes by arguing that if researchers are to get a fuller understanding of why those in the construction process do what they do, a more holistic and adventurous approach to research is required.

In Chapter Two, the role of architectural research in the built environment is considered. Penn argues that architectural research is important to understanding the production and management of the built environment. However, he goes further in this chapter by arguing that architectural research is also crucial to architectural practice. One important area of research is then examined: the analysis of spatial layout in plan. The chapter concludes by highlighting the tensions between two kinds of knowledge: scientific and social. Finally, the drift towards the objectified, explicit and scientific knowledge is discussed and the limitations of this approach are raised. Parallels with Dainty’s arguments for methodological pluralism in construction management are clear.

A third area of enquiry in the built environment is examined in Chapter Three – that of legal research. Here, Chynoweth recognises the array of component disciplines that comprise the built environment and states the importance of increased understanding across, what can be conceptualised as, an interdisciplinary or multidisciplinary field. The specific nature of the epistemological, methodological and cultural features of legal research is then explained. In common with the first two chapters, Chynoweth concludes with comments on the dominance of the scientific approach to knowledge acquisition in the built environment. He argues that, for legal researchers, this can cause problems when communicating their work, since empirical investigation is not their primary concern.

Morton and Wilkinson state that the built environment professions are male-dominated. Hence, gender-related research to understand the field, and to bring about change, is both necessary and desirable. It is argued that feminist research is conducted for, by and about women, and the authors explain that, despite higher numbers of women entering higher education in the 1990s, discrimination and barriers to progression are still experienced. They conclude by summarising various approaches to feminist research with examples of work undertaken in the field.

As argued by Chynoweth, the built environment is multidisciplinary. One important discipline for many researchers in our field is economics. However, in many respects the construction industry is unlike the generalised industry of economic theory. In Chapter Five, Ruddock discusses issues involved in undertaking economic analysis and attempting to model the built environment sector, in the context of its relationship with the wider economy. Research in the field of construction economics often means applied research in the field to test the validity of hypotheses. This requires meaningful analysis of the data surrounding the sector, and a feature of this chapter is consideration of how data are used to analyse this relationship with the rest of the economy.

A constant thread of interest through many of the chapters in this book is the issue of knowledge. In this sense, philosophy is not another discipline within the arena of built environment research, but a foundation. Questions concerning the process of knowledge acquisition and its limits are fundamental to methodology in all areas whether legal, technological, social or economic. Hence, Chapter Six explores the subject known as epistemology. Knight and Turnbull commence by arguing that many
postgraduate researchers struggle when they first start to consider issues surrounding knowledge in their discipline. One reaction is to ignore the problem; another reaction is to get so engrossed in reading philosophy books that practical progress is jeopardised. The aim of Chapter Six is to provide a crossing for the non-specialist into this challenging terrain. It is argued that, since many words such as ‘postmodernism’ and ‘positivism’ are used in an inconsistent manner, the most appropriate way to engage in epistemology is through an historical appreciation of the development of key ideas and thinkers. Hence, the chapter takes the reader on a journey from classical to modern epistemology and concludes with a reflection on more recent ‘postmodern’ ideas.

Many of the chapters in this book advocate more pluralism and, in particular, a movement towards what can broadly be described as qualitative methods. However, what may be seen as a counter-argument in support of scientific theory is forwarded by Runeson and Skitmore. What makes this chapter particularly interesting is that these authors were at the vanguard of the mid-1990s debate referred to by Dainty in Chapter One. Chapter Seven explores the logic of scientific theory and the importance of working as a scientist. The arguments throughout this chapter are essentially Popperian and this provides interesting reading for those undertaking experimental work. However, those who may be attempting to justify an alternative to a scientific approach should also consider reflecting on the authors’ arguments.

A popular theoretical alternative to the scientific approach, which is often but not exclusively associated with qualitative methods, is grounded theory. This methodology allows researchers to work inductively, from data to theory, and is often used as a model in projects, in which there is a lack of relevant testable theory. In Chapter Eight, Hunter and Kelly explore the literature surrounding grounded theory. They draw out a number of issues concerning the role of literature in theory development and data collection strategies. One important area for qualitative researchers to consider is the range of analytical strategies available. In this chapter, data coding is specifically considered and this will provide a foundation for those interested in computer-based qualitative analysis, as discussed by King in Chapter Twelve.

Many readers will be aware of case study research, even though they may have difficulty defining what a case study actually is. The confusion around the nature of this methodology is acknowledged by Proverbs and Gameson in Chapter Nine. The chapter considers a variety of issues around designing, identifying and selecting the cases. When undertaking case studies, researchers are often overwhelmed by the information collected so an organised approach is required. The authors outline some of the data options available including: documents, archival records, interviews, detached or direct observations, participant observation and physical artefacts. A practical example of a case study on the topic of project team dynamics is used to demonstrate the use of this methodology in a built environment context.

As the reader progresses through the book, it should be clear that there is a movement from theory to practice and it is the practice of undertaking interviews which is explored by Haigh. Interviews are used widely by researchers and vary in type and structure, making them an extremely versatile method. However, as argued in this chapter, this is not a clinical objective data collection tool in most situations. The human dynamics between researcher and researched complicate the picture and this relationship is at the core of understanding the nature of interviewing.

As an alternative, or in addition to interviews, many projects use a questionnaire, particularly when quantitative data are required. In Chapter Eleven, Hoxley examines the design and use of questionnaires. He considers the importance of wording, structure, sampling and coding. The second part of the chapter examines factor
analysis – a popular technique in statistics for data reduction. Attempting to reduce many indicator variables down to a few underlying concepts is the aim of this technique. Using a practical example of the service quality experienced by clients of professional surveyors, Hoxley demonstrates the procedure using the computer-based statistical package SPSS.

The next chapter also examines the use of computers in data analysis, but this time from the perspective of analysing qualitative data. In Chapter Twelve, King outlines the important benefits that computers bring to research analysis, particularly when dealing with a large number of codes. However, he also argues that there are many dangers for the novice researcher, especially when the software starts to dominate the analysis. Additional problems surrounding training are also considered. Chapter Thirteen is again focused on data analysis, but this time from a quantitative perspective. In this chapter, Leishman introduces the reader to a range of statistical concepts and tests that may be useful to researchers working in the built environment. The reader is provided with sufficient background to begin exploring issues in the application of statistical techniques.

Occasionally, when new researchers read about techniques being used by academics, it can be difficult to gain an understanding of the method. This may be for two reasons. Firstly, in journal articles, authors have to remain within strict word limits and focus on the outcomes of the research rather than the methods. Secondly, many textbooks that cover such techniques can be highly specialised and difficult to access for anyone new to the area. In Chapters Fourteen and Fifteen, two such techniques are described where the authors are given the space to focus on method rather than the outcomes of their research. In the first of these chapters, Boussabaine and Kirkham explore the use of artificial neural network (ANN) modelling. The authors provide the reader with a general introduction to ANNs, some background to methods and methodology, a review of current research and an evaluation of the most significant applications of ANN techniques. In the second, Pryke explains the use of social network analysis. He argues that since this method is capable of analysing qualitative concepts through a mathematical and graphical approach, there is enormous scope for more utilisation of this form of structural analysis in built environment research.

The final four chapters in this book turn to more generic issues of a practical nature. Griffith and Watson, in Chapter Sixteen, cover a topic almost all postgraduate researchers will be concerned by: managing the thesis. Here they explore a number of issues including questioning what a thesis actually is. This is a very important matter for research students since ultimately the thesis, and the associated oral examination, will form the basis of the final assessment. Throughout this chapter, the authors focus on the need to project manage the thesis, and how students should accept personal responsibility for this important task. Additionally, there is practical advice for those who need to prepare for an oral examination of their thesis.

For those considering an academic career, developing a portfolio of publications is critical. In Chapter Seventeen, Hughes (who currently edits one of the leading journals in the built environment with Dainty) reflects on the practice and process of publishing academic journal papers. This chapter is full of valuable advice, giving the reader an interesting insight into the views of an experienced editor. Hughes argues that with a clearer understanding of the processes involved, authors can significantly improve their success rate in getting papers published.

Nevertheless, sometimes things just do not go to plan. We can lose interest in our work long before it gets to the stage of publication or even thesis. This can happen for a variety of reasons. We may move to a new job, sometimes we just feel there are more important things in life than a research project, at other times personal factors outside
our control change. However, having spent months or even years on a project, failure to complete a research degree is often something which may remain a lifelong regret. Knowing how to deal with the inevitable motivational lows, is probably one of the main factors which determine our ability to succeed. In Chapter Eighteen, Boyd tackles the issue of researcher fatigue. He offers some theoretical insights in to understanding ourselves, in addition to giving practical advice on how to keep going.

The final chapter looks to the future of built environment research. In this concluding chapter, Ratcliffe puts forward the idea that the methods of the past may not be the most profitable for stretching the boundaries of knowledge in the twenty-first century.

This, in many respects, takes us ‘full circle’ since this is the contention of several of the chapters at the start of this book. It is hoped that this book will contribute to a new sense of shared methodological understanding, both across and within the disciplinary fields that broadly constitute built environment research.

Andrew Knight and Les Ruddock
2008
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Chapter One
Methodological pluralism in construction management research
Andrew Dainty

Introduction

A fundamental question confronting anyone doing social research is for them to construct a philosophical position and orientation towards their enquiry. Unlike many domains which have established practices, construction management is a relatively new field which draws from both the natural and social sciences. As such, many different theories of knowledge or paradigms compete for methodological primacy. Researchers draw from both traditions when designing their research projects in a way which remains sensitive to the theoretical and philosophical foundations upon which their enquiry is based. However, the extent to which this has resulted in a plurality of methodological perspectives is questionable. For many years positivism and quantitative methods have been in the ascendency in construction management research (Fellows and Liu, 1997: 78–79). This has promoted an orthodoxy of the application of ‘natural science’ methods to study social phenomena and an attendant focus on explaining human behaviour. In contrast, proponents of interpretivism, as an alternative paradigm, espouse the importance of understanding human behaviour (Bryman and Bell, 2003: 15). This has an emphasis on the empathetic comprehension of human action rather than the forces which shape it (ibid. 16). This perspective arguably has the potential to provide complementary insights, enriching understanding of the perspectives of those who work in the sector.

The construction management research community has an interesting history when it comes to debating the merits and demerits of different theoretical and philosophical perspectives on methodologies from different research paradigms. Concerns at the apparent dominance of positivism and the role of theory in construction management research in the mid-1990s led to a philosophical debate in the journal Construction Management and Economics. This debate was initiated by two papers in particular (Seymour and Rooke, 1995; Seymour et al., 1997), which questioned the dominance of the rationalist position which seemingly underpinned most research within the community, suggesting that this tacitly endorsed the very attitudes in need of change in the industry. They suggested that the culture of research must change if researchers were to have an influence on the industry. In responding to Betts and Lansley’s (1993) review of the first ten years of the Journal, Seymour et al. (1997) further questioned the dominance of the scientific theorising associated with realist ontological and epistemological positions, given that the ‘object’ of most construction management research is people. This suggested that the construction management discipline underestimated the interpretive process. These papers invoked a vigorous and somewhat polarised response around the relative merits of different research approaches.
Seymour and his colleagues were accused of being ‘anti-scientific’ and of propagating an approach which has yet to yield productive output, theories or progress (Runeson, 1997). Further, they were accused of promoting an approach more akin to consultancy than research, and of advocating methods which themselves have been widely criticised within the sociological literature (Harriss, 1998). Seymour and Rooke (1995) were also accused of setting out battle lines in the way that they dichotomised rationalist and interpretative paradigms to the detriment of research standards (Raftery et al., 1997). Seymour and colleagues defended their position by counter claiming that Raftery et al. themselves undermined standards by failing to recognise that different methods suit different purposes and that their position was symptomatic of the widespread confusion over terms such as ‘method’, ‘methodology’ and ‘paradigm’ (Rooke et al., 1997). They also questioned Runeson’s definition of ‘science’, defending the rigour of the methods associated with the interpretive paradigm and their value in establishing the meaning ascribed by the social actors being studied (Seymour et al., 1998). Various other authors weighed into the debate (Loosemore et al., 1996), with some questioning its value given the apparent focus on research methods as opposed to methodology (Root et al., 1997).

More than a decade on, a number of questions emerge in terms of the legacy of this debate in terms of the impact it has had on construction management research. Firstly, have alternative research paradigms been embraced, or did the construction management community merely revert to its traditional adherence to positivism and quantitative methods? Secondly, do those within the construction management community draw upon a greater diversity of methods to enrich their understanding of the actuality of practice from the perspectives of those who work in the sector? And thirdly, has there been a move towards mixing paradigms and methods, or have the rival camps within the construction management research community remained entrenched and dichotomised within their own ontological and epistemological communities? This chapter aims to attempt to provide some answers to these questions in order to establish whether the debate has had a lasting legacy on the way in which construction management researchers now ‘do’ social research. In particular, it examines the extent to which construction management researchers have embraced ‘multi-strategy’ research – that which integrates quantitative and qualitative research within a single design (cf. Layder, 1993; cited in Bryman and Bell, 2003). In management science research, this perspective has been most recently associated with ‘multimethodology’, the practice of combining methodologies from different paradigms in an attempt to providing richer insights into relationships and their interconnectivities within organisations (Mingers and Gill, 1997). In advocating such a position, the aim is not to infer that combining strategies is inherently ‘better’ than employing a single research strategy, but to present an alternative perspective on how construction management researchers might design their research projects in the future.

Initially, the basic principles of research strategy and design are examined and the ontological and epistemological assumptions which underpin different research paradigms and strategies examined. Next, the methods utilised by researchers in construction management are examined through examination of a recent complete volume of the peer-reviewed journal Construction Management and Economics. This analysis reveals the extent to which methodological pluralism has been embraced by the research community to date. In addition, it examines the types of interpretative research methods applied by construction management researchers and questions. Thus, the results reveal both how the construction management research community has responded to the philosophical questions asked of it in the mid-1990s, and the
diversity of research approaches that this has induced. The ensuing discussion speculates as to the likelihood of the insights gained through these research approaches informing the development and evolution of the industry that it serves. The likely impact of an enduring polarisation of philosophical position is juxtaposed against the potential benefits of multimethodological research design. This is used as the basis for the construction of an argument for the promotion of methodological pluralism in construction management research as a reaction to the entrenched views which seemingly pervade much of the community at present.

Research strategy and design

As a precursor to investigating the methods adopted by construction management researchers, it is necessary to review briefly the decisions which underlie research methodology, strategy and design. Clearly, research methodology in social enquiry refers to far more than the methods adopted in a particular study and encompasses the rationale and the philosophical assumptions that underlie a particular study. These, in turn, influence the actual research methods that are used to investigate a problem and to collect, analyse and interpret data. In other words, research methods cannot be viewed in isolation from the ontological and epistemological position adopted by the researcher.

In philosophy, ontology can be taken to broadly refer to conceptions of reality. Objectivist ontology sees social phenomena and their meanings as existing independently of social actions, whereas constructivist ontology infers that social phenomena are produced through social interaction and are therefore in a constant state of revision (Bryman and Bell, 2003: 19–20). Epistemology refers to what should be regarded as acceptable knowledge in a discipline (ibid. 13). Epistemological perspectives are bounded by the positivist view that the methods of the natural sciences should be applied to the study of social phenomena, and the alternative orthodoxy of interpretivism which sees a difference between the objects of natural science and people in that phenomena have different subjective meaning for the actors studied. Understanding the influence that competing paradigms have on the way in which research is carried out is fundamental to understanding the contribution that it makes to knowledge. Taking Bryman’s (1988) definition of a paradigm as a ‘cluster of beliefs and dictates which for scientists in a particular discipline influence what should be studied, [and] how research should be done’, different research paradigms will inevitably result in the generation of different kinds of knowledge about the industry and its organisations. This perspective sees different paradigms as incommensurable, and so the choice of which paradigm to adopt fundamentally affects the ways in which data are collected and analysed and the nature of the knowledge produced.

In broad terms, the term ‘research design’ describes the ways which the data will be collected, analysed in order to answer the research questions posed and so provide a framework for undertaking the research (Bryman and Bell, 2003: 32). Making decisions about research design is fundamental to both the philosophy underpinning the research and the contributions that the research is likely to make. For example, qualitative research stresses ‘ecological validity’; the applicability of social research findings to those that exist within the social situation studied. Choosing a reductionist approach to examining social phenomena (such as questionnaire survey) is likely to distance the enquiry from the social realities of the informant, thereby undermining its ecological validity. Thus, methods are inevitably intertwined with research strategy.
Without wishing to dichotomise or pigeonhole researchers within the construction management community, it is important to distinguish between the different types of research conducted as a backdrop to discussing the diversity of the methods employed. In broad terms, construction management research either adopts an objective ‘engineering orientation’, where the focus is on discovering something factual about the world it focuses on, or a subjectivist approach, where the objective is to understand how different realities are constituted (see Harty and Leiringer, 2007). Whilst the former emphasises causality and generalisability, the latter focuses on localised subjective meaning. In this chapter a distinction is also drawn between ‘quantitative’ and ‘qualitative’ research. Whilst this distinction is considered by some as unhelpful (see for example Layder, 1993; cited in Bryman and Bell, 2003), it nevertheless provides a useful framework for categorising the methods used by researchers. Indeed, it can be argued that quantitative and qualitative research are themselves rooted in particular ontological and epistemological foundations (i.e. objectivism and constructivism, and positivism and interpretivism respectively). Accepting this association between research methods and research paradigms enables philosophical differences in the role that theory plays in research to be viewed through the lens of the methods employed by researchers. In other words, the methods employed can be used as a proxy for the paradigm adopted. It is accepted that this represents an oversimplification of reality. For example, it is plausible that qualitative methods can be employed for theory testing as well as theory generation. However, as will be discussed later in this chapter, this is the case in the vast majority of construction management research projects.

The dominant research paradigm within construction management

In order to examine the methodological positions and research methods adopted by construction management researchers, an analysis was carried out of every paper published in *Construction Management and Economics* in Volume 24, 2006 (see Dainty, 2007). Each paper was scrutinised for statements as to the methodological position of the author(s) and the methods employed. Where this was not unambiguously stated within a defined section of the paper, efforts were made to identify the methods adopted from the narrative description of the research. In some cases, no discernable empirical research methods were adopted as the paper was a review-type contribution. In other cases, papers drew upon a multi-paradigm research design. These papers were defined as ‘review’ and/or ‘mixed methods’ respectively. Thus, four broad classifications were used for summarising the methodologies adopted within the papers as follows:

1. **Quantitative** – unambiguously adopting quantitative methods rooted in a positivist research paradigm.
2. **Qualitative** – unambiguously adopting qualitative methods rooted in an interpretative research paradigm.
3. **Mixed methods** – comprising a combination of both inductive and deductive research methods.
4. **Review** – not utilising empirical research methods.

For those papers which reported research which adopted a qualitative (2) or mixed method (3) approach, a further sub-classification step was undertaken to categorise the methods used. These categories were established inductively and were not based