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# Case study as a research strategy: Investigating extreme weather resilience of construction SMEs in the UK

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## Abstract

Determining an appropriate research methodology is considered as an important element in a research study; especially in a doctoral research study. It involves approach to the entire process of a research study, starting from theoretical underpinnings and spanning to data collection and analysis, and extending to developing the solutions for the problems investigated. Research methodology in essence is focused around the problems to be investigated in a research study and therefore varies according to the problems investigated. Thus, identifying the research methodology that best suits a research in hand is important, not only as it will benefit achieving the set objectives of a research, but also as it will serve establishing the credibility of the work. Research philosophy, approach, strategy, choice, and techniques are inherent components of the methodology. Research strategy provides the overall direction of the research including the process by which the research is conducted. Case study, experiment, survey, action research, grounded theory and ethnography are examples for such research strategies. Case study is documented as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. Case study was adopted as the overarching research strategy, in a doctoral study developed to investigate the resilience of construction Small and Medium-sized Enterprises (SMEs) in the UK to extreme weather events. The research sought to investigate how construction SMEs are affected by EWEs, respond to the risk of EWEs, and means of enhancing their resilience to future EWEs. It is argued that utilising case study strategy will benefit the research study, in achieving the set objectives of the research and answering the research questions raised, by comparing and contrasting with the alternative strategies available. It is also claimed that the selected strategy will contribute towards addressing the call for improved methodological pluralism in construction management research, enhancing the understanding of complex network of relationships pertinent to the industry and the phenomenon being studied.

**Keywords:** Case study, Construction, Extreme Weather Events, Research methodology, SMEs

# 1. Introduction

Determining an appropriate research methodology is considered as an important element in a research study; especially in a doctoral research study. This however, as Walker (1997) noted in a discussion of the research methodology adopted in his doctoral research, is a difficult step in a research study. Establishing the research methodology involves approach to the entire process of a research study, starting from the theoretical underpinnings and spanning to data collection and analysis, and extends to developing the solutions for the problems being investigated. Research methodology in essence is focused around the problems to be investigated in a research study and therefore varies according to the problems investigated. It is important in a doctoral study that there is consistency between research questions, methodological and theoretical approaches (Churchill and Sanders, 2007). Research strategy is one of the components of research methodology. Research strategy provides overall direction of the research including the process by which the research is conducted (Remenyi *et al.*, 2003). Case study is one of such research strategies. Here, a doctoral study which sought to adopt case study as the preferred research strategy is discussed.

This doctoral research sought to investigate the resilience of construction Small and Medium-scale Enterprises (SMEs) in the UK to Extreme Weather Events (EWEs), with the aim of developing a decision making framework that can be utilised by SMEs in construction to enhance their resilience to such EWEs; See Wedawatta *et al* (2010b; 2010a) for a detailed discussion about the research, and the issues being investigated. In order to achieve the aim of the research several objectives were defined, and several research questions were raised. Objectives of the research included examining the existing coping strategies of SMEs against extreme weather events, assessing the coping capacity of the construction SMEs against EWEs, and identifying lessons that can be learned by construction SMEs from SMEs operating in other industry sectors. The research questions investigated will be discussed subsequently in the paper. Nature of the research and the subject issues being investigated necessitated the research to encompass a range of subject localities including construction management, business continuity management, SMEs, and disaster management. However, it was sought to contextualise the research primarily within the construction management domain of knowledge. Case study research was adapted as the overall research strategy in conducting the research. A multiple embedded research design was adopted, and multiple sources of evidence; semi-structured interviews, questionnaire survey and documentations, were used for data collection. The focus here is mainly limited to a discussion on selecting case study as the preferred strategy, rather than its design.

This paper presents the rationale for selecting case study research strategy over other research strategies, and justifies its adoption within the research. First it is sought to briefly discuss the theoretical basis of research strategy and its position within the overall research methodological framework. The use of case study as a research strategy is discussed and justified by presenting the rationale for adapting case study in the research. Criteria followed in the research to ensure validity and reliability of the research is briefed consequently, and the conclusions are drawn.

## 2. Research methodology and research strategy

Remenyi et al (2003) described methodology as the “overall approach to a problem which could be put into practice in a research process, from the theoretical underpinning to the collection and analysis of data”. On a similar note, Collis and Hussey (2009) identified methodology as the “overall approach to the entire process of the research study”. Research methodology, as per the above definitions, is focused around the problems to be investigated in a research study and hence is varied according to the problems to be investigated. Saunders et al (2009) presented the overall research methodology in the form of an “onion”, in which the thoughts with regard to the research problem lie in the centre and thus several layers have to be “peeled away” before coming to this central position. These layers are the important aspects to be considered in determining the research methodology for a particular research study. Accordingly, research philosophy, approach, strategy, choice, time horizon, and techniques were the layers identified. Whilst different classifications and definitions of these terms exist, classification put forward by Saunders et al (2009) is preferred here, as it provides an unambiguous overall framework for the complete research process. As mentioned above, the discussion here is limited to the “research strategy”, and its application to this particular doctoral research study.

Saunders et al (2009, pp600) defined research strategy as “the general plan of how the researcher will go about answering the research questions”. On a similar note, Bryman (2008) identified research strategy as “a general orientation to the conduct of research” (pp698). Research strategy, according to Remenyi et al (2003), provides the overall direction of the research including the process by which the research is conducted. Saunders et al (2009) mentioned that appropriate research strategy has to be selected based on research questions and objectives, the extent of existing knowledge on the subject area to be researched, the amount of time and resources available, and the philosophical underpinnings of the researcher. Adapting a quite different approach, Yin (2003b) recommended that a particular research strategy has to be selected based on three (3) conditions; the type of research question, the extent of control an investigator has over actual behavioural events, and the degree of focus on contemporary or historical events. There are various different research strategies with distinctive characteristics available from which a researcher may select, based on the above criteria. Both Yin (2003b) and Saunders et al (2009) acknowledged that although various research strategies exist, there are large overlaps among them and hence the important consideration would be to select the most advantageous strategy for a particular research study. Some of the common research strategies used in business and management are experiment, survey, case study, action research, grounded theory, ethnography, archival research, cross sectional studies, longitudinal studies and participative enquiry (Easterby-Smith *et al.*, 2008; Collis and Hussey, 2009; Saunders *et al.*, 2009). From these various strategies, this research sought to adopt the case study research strategy as the appropriate strategy for research. Following sections briefly describe the case study strategy and justify its preference as opposed to other strategies.

### **3. Case study research**

Yin (2003b) defined case study as an “empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (pp13). This part of Yin’s definition covers the scope of case study research, whereas a second part covers a range of characteristics. This part of the definition acknowledges that the phenomenon and context are not always clearly distinguishable in real-life contexts. Technical characteristics included in Yin’s (2003b) definition included; case study deals with technically distinctive situation, relies on multiple sources of evidence, and benefits from prior development of theoretical prepositions to guide data collection and analysis. Yin (2003a) identified case study as the preferred research strategy when the phenomenon and the context are not readily distinguishable. Highlighting that Yin’s definition does not capture one of the discernible characteristics of case study research from other research methods; which is the use of a single case or a small number of cases, Dul and Hak (2008) defined case study as “a study in which (a) one case (single case study) or a small number of cases (comparative case study) in their real life context are selected and (b) scores obtained from these case are analysed in a qualitative manner (2008, pp4).

Although case study research is more often associated with contemporary phenomenon as highlighted in Yin’s, and Dul and Hak’s definitions, Eisenhardt and Graebner (2007) pointed out that case studies can also be historical. The definition put forward by Collis and Hussey (2009), also identified some of the discernible characteristics of case study strategy. They defined case study as “a methodology that is used to explore a single phenomenon in a natural setting using a variety of methods to obtain in-depth knowledge”. Therefore, it can be seen that case study research is capable of accommodating different research techniques and is normally used when it is required to obtain in-depth knowledge with regard to a particular phenomenon. Case study research, moreover, can accommodate both qualitative and quantitative data (Yin, 2003b; Gerring, 2007), allowing the researcher to get a rich mix of data for the study. Whilst case study research is a distinctive research strategy which presents many advantages to a research study, and allows in-depth investigation of the issues at hand, it is not without criticism. Yin (2003b) identified lack of rigor, being bias, difficulty to generalise, and taking too long and producing hefty documents as some of the common criticisms of case study research. In response, it was noted that the quality of a case study can be enhanced by following the four tests that are common to empirical research; construct validity, internal validity, external validity and reliability (Yin, 2003b; Fellows and Liu, 2008). These will be further discussed subsequently.

#### **3.1 Rationale for selecting case study research**

It was sought to adopt case study as the preferred research strategy in the doctoral research study reported here. Following were the main factors that influenced preferring case study research over other research strategies.

- Satisfying the criteria for selecting case study strategy

Yin (2003b) recommended to satisfy three conditions to decide upon a research strategy. These were; 1. Type of research questions posed, 2. The extent of control the researcher has over actual

behavioural events, and 3. The degree of focus on contemporary issues (pp5). Accordingly, case study was preferred when the research questions take the form of “how” and “why”. The doctoral research reported here was developed to answer the research questions of 1. How do EWEs affect the activities of construction SMEs and other SMEs, 2. How do the construction SMEs currently cope with the effects of EWEs on them and their supply chain, and why do/do not they implement coping measures 3. How to improve the resilience of construction SMEs and their supply chains to the effects of EWEs, and 4. What lessons can be learnt from SMEs operating in other industry sectors. Looking at the research questions it can be noted that they predominantly consist of how and why type of research questions, favouring a case study research.

The second condition identified by Yin (2003b), is the degree of control the researcher has over actual behavioural events. In this research, the researcher did not have control over the behaviour of construction SMEs or the EWEs that impact them. The researcher was outside to the “case”; construction SMEs, and was an observer. Further, there was no possibility of manipulating the behaviour of SMEs (independent variable) in order to investigate the impact on a dependent variable. Further the issues being investigated were contemporary and about how the construction SMEs are affected, respond and cope with EWEs currently; satisfying the third condition for selecting case study research.

- Appropriateness to investigate the research in hand

The context of the study was construction SMEs. Perren and Ram (2004) noted that case study research is gaining acceptance within the small business research community. Moreover, Chetty (1996) concluded that utilising case study research in a SME context leads to the observation of new insights that would not have emerged through a strategy like a large survey. This was of particular importance to the research at hand, as the existing literature was limited with regard to construction SME response to EWEs. From a construction industry perspective, the likes of Sexton and Barrett (2003), Sexton et al (2006), Ribeiro and Fernandes (2010), and Rezgui and Miles (2010) have successfully used case study method to study construction SMEs, suggesting the applicability of the strategy in studies involving construction SMEs.

Proverbs and Gameson (2008) mentioned case study as highly relevant to an industry like construction consisting of different types of businesses and organisations. It was further noted that application of case study research in construction management domain remains low, and that there is significant scope for further application within the domain. Dainty (2008) identified quantitative methods as the dominant research paradigm within the construction management research, confirming the claim of Proverbs and Gameson (2008) that the application of case study research within the domain is limited.

The above discussions point out that case study strategy has been and can be used successfully to conduct research on SMEs in construction. In fact, it can be argued that case study strategy, where in-depth knowledge can be obtained, suits the study of a heterogeneous sector like SMEs; where it is often difficult to make strong generalisations across the sector due to significant differences that exist between different construction SMEs.

- Ability to accommodate different research techniques

The objectives and the research questions investigated in the research favoured a combination of different research techniques, in data collection and analysis. For instance, the objective of identifying coping strategies of SMEs favoured a questionnaire survey approach in order to identify a range of coping strategies, whereas the objective of assessing current coping capacity of construction SMEs favoured a method that warrant in-depth analysis, hence semi-structured interviews were preferred. Adopting case study strategy allowed the use of multiple sources of data collection and analysis, allowing the researcher to address the research objectives and answer the research questions satisfactorily. Ability to accommodate different research techniques, both qualitative and quantitative, is a salient feature of case study research (Yin, 2003b; Gerring, 2007). Accordingly, it was sought to use semi-structured interviews, questionnaire survey and document review as the data collection techniques, whereas content analysis, cognitive mapping, and quantitative analysis were used for data analysis.

It was thought that opting for a mixed method research design would also contribute towards methodological pluralism in construction management research, in which quantitative research is dominant, as identified by Dainty (2008). He called for greater use of qualitative approaches and adoption of a diversity of approaches, shifting away from the traditional positivist viewpoint, in order to better understand the complex network of relationships present within the industry. Fellows (2010) concluded that such methods are gaining recognition within the construction management body of knowledge.

- Compatibility with the philosophical viewpoint

Based on the researcher's underpinning philosophical views, the research was positioned within the philosophical viewpoint of a pragmatist. According to Saunders et al (2009), pragmatism is based on the argument that "the most important determinant of the epistemology, ontology, and axiology you adopt is the research question" (pp109). Whilst the research was positioned and approached with a pragmatic viewpoint, the nature of the research questions meant that the research was narrowed towards interpretivism, subjectivism and value-laden research on the philosophical spectrums of epistemology, ontology and axiology. Although case studies can be conducted by adopting a positivist approach; for instance see Rezgui and Miles (2010), it is often associated with interpretivism/realism and pragmatism; for instance see Sexton and Barrett (2003). Further, Sexton (2007) plotted different research strategies on a continuum of epistemology and ontology spectrums. Accordingly, case study research was placed in between the two extremes (realism/positivism and idealism/interpretivism), within the territory of idealism/interpretivism, suggesting that it is common for case studies to be adopted in such a philosophical positioning. Hence, it was established that case study research was compatible with the philosophical positioning of the research, supporting the case for adopting case study as the preferred research strategy.

- Suitability of case study research, over other research strategies

A research strategy like experiment was considered less applicable to this study as the researcher did not have control over the phenomenon being studied. This was because the experimental studies attempt to manipulate independent variables to observe behaviour of the dependent variables (Collis and Hussey, 2009), which was not possible to be achieved in this research. The survey strategy is usually associated with the deductive approach (Saunders *et al.*, 2009), and positivist philosophical positioning (Collis and Hussey, 2009). As discussed previously, this research inclined towards interpretivism and undertook a more inductive approach, thus, survey strategy was deemed inapplicable to this research. Ethnography requires the researcher to be immersed in a setting, and become part of the group under study in order to understand the phenomenon being studied (Easterby-Smith *et al.*, 2008). As the researcher was outside to the context in this research, construction SMEs, ethnography did not seem to be an appropriate strategy for this research.

Grounded theory seeks to develop a well integrated set of concepts that provide a thorough theoretical explanation of phenomena under study (Corbin and Strauss, 1990). In grounded theory, theory is derived from data, systematically gathered and analysed through the research process in an iterative process (Bryman, 2008). Grounded theory perhaps can be identified as the next best alternative for this research, due to the nature of research questions being asked. However, this research sought to explore phenomena in a real-life context and examine how the issues with regard to the general SME population, apply to construction SMEs. So, it was not purely attempting to generate theory out of data, but also sought to apply existing theory to construction SMEs. Hence, grounded theory was deemed less suitable, when compared to the case study strategy.

- Opportunity presented by being part of a wider research study

The doctoral research discussed here was part of a wider research study titled “Community Resilience to Extreme Weather – CREW”. Being part of a wider research project, where the first and second authors were responsible for designing and conducting an investigation of SME response to EWEs in the UK, presented an opportunity to adopt some of the research techniques used in the CREW project by the authors for the purpose of the doctoral research. Whilst it has to be noted the “case” defined for two studies (in CREW – SMEs in South East London, in doctoral research – a construction SME), context, and the design of the case study was fundamentally different (where the design of the case study in the doctoral study was unique), using the case study strategy allowed the researcher to utilise his involvement in the research project towards the doctoral study and use some of the research methods to enhance the doctoral study without compromising the objectives, research questions or philosophical positioning of the doctoral research.

### **3.2 Validity and reliability in case study research**

As case study research is subjected to criticism, it is important that validity and reliability of a case study research is established, by following the four tests of construct validity, internal validity, external validity and reliability. Whilst it is not intended here to discuss these in detail, Table 1 highlights the different tactics used in this research to satisfy the aforementioned tests, and thereby ensure the validity and reliability of the research strategy used.



*Table 1- Case study tactics for four design tests (adapted from Yin2003b)*

<i>Test</i>	<i>Case study tactic used in the research</i>
<i>Construct validity</i>	<i>Use of multiple sources of evidence Review of draft case study reports by key informants</i>
<i>Internal validity</i>	<i>Pattern-matching Explanation building</i>
<i>External validity</i>	<i>Use of replication logic</i>
<i>Reliability</i>	<i>Use case study protocol Develop case study database</i>

## **4. Conclusion**

Rationale for selecting case study as the research strategy in a doctoral study aimed at undertaking an in-depth investigation in to resilience of construction SMEs to EWEs was presented and discussed. It was sought to adopt case study as the preferred research strategy due to a number of reasons. Whilst many of the rationale presented were consistent with the theory, a somewhat new as well as open to debate reason is also presented. This is the opportunity presented by the research being part of a wider research study. It is argued that utilising the options available was justifiable, as long as it was consistent with the objectives of the research, research questions, and philosophical positioning used and these are not compromised. It is also important that the originality of the doctoral study and its research design is preserved. It is thought that the use of case study strategy and its design were consistent with the aforementioned.

Although the success of the strategy adopted cannot still be concluded, as the research is still in progress, rationale for selecting the case study research and the different tactics followed to comply with the four tests of validity and reliability suggest that this is likely to be favourable. Importantly, it is claimed that the selected strategy will contribute towards addressing the call for improved methodological pluralism in construction management research, enhancing the understanding of complex network of relationships pertinent to the industry and the phenomenon being studied. Hence, it is thought that the adapted research strategy will not only benefit the research study in hand, but also the domain of knowledge within which the research will be contextualised.

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