Using Multi-Case Approaches In Project Management Research: Learning from the MEGAPROJECT Experience

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1.0) Introduction

Project management research questions are predominately open. Arguably, the question of paramount importance to project management research in its broadest exposition is *"How and why do ‚projects' behave in the way that they do?"* which is closely followed in managerialist perspectives with the question „*How do we make projects perform better?*" The propensity to ask open research questions is extant in much of the project research literature. For example, Pilbeam[1] (2013) poses a whole series of open questions on how new projects operating outside of a stable organizational context are organized breaking down this question into a further series of open questions. (i.e. How do these temporal structures change over time? How does a group of individuals with little or no prior knowledge of each other come to adopt the same practices as a group with considerable common experience? How do novices familiarize themselves with the process, and what do the other team members do to adjust, and to aid their integration?). Soderland and Maylor[2] (2012) ask a series of similarly open questions in their consideration of five main areas of project management research as follows:

- Challenge I: Strategy and execution: *how to address the strategy difficulties in light of execution feasibility?*

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[1] Colin Pilbeam, Coordinating temporary organizations in international development through social and temporal embeddedness, International Journal of Project Management, Volume 31, Issue 2, February 2013, Pages 190-199

[2] Jonas Söderlund, Harvey Maylor, Project management scholarship: Relevance, impact and five integrative challenges for business and management schools, International Journal of Project Management, Volume 30, Issue 6, August 2012, Pages 686-696

•	Challenge II: Business and technology: *how is possible to integrate business and technology skills in project managers?*

•	Challenge III: Hard and soft skills: *how is possible to integrate hard skill (planning techniques, control tools, etc.) and soft skills (emotions of projects, care in project management) in project managers?*

•	Challenge IV: Research and practice: Managers do not make good use of research findings and repeat making the same mistakes over and over again, despite considerable research findings pointing in a different direction. *How is possible to link the research from academics to the practice?*

•	Challenge V: Exploration and exploitation. *How is possible to select and deliver to project manager the most important finding in project manager?*

Case methods have a long association with research investigations seeking to answer this type of open resaerch question (Yin, 2002). This is reflected in the widespread adoption of case approaches in project management research (e.g. Nitithamyong and Skibniewski[3] (2011), Koners and Goffin[4] (2007)). However case approaches are still perceived a problematic by some because of their perceived lack of rigour and extendability of findings. One approach to overcoming these criticisms is the use of multi-case research. This chapter aims to review multi-case methods in the context of project management research and to demonstrate their ability to overcome these and therefore offer a great potential for project management research.

This chapter begins by reviewing case approaches, commencing with single case research and the problems associated with this. It then examines multi-case research and how it may overcome some of these problems. It delineates the main approaches to cross-case analysis, (one of the key steps in successful multi-case research,) and reviews the comparative advantages of inductive and deductive approaches to pursuing this. The chapter then proceeds to describe a practical application of multi-case research to the MEGAPROJECT COST Action investigation into megaproject design and delivery. This application acts as a lens through which to explore the potential benefits that a multi-case approach may bring to project management research and ways in which operational difficulties may be overcome.

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[3] (Nitithamyong, P., Skibniewski, M.J. Success factors for the implementation of web-based construction project management systems: A cross-case analysis (2011) Construction Innovation, 11 (1), pp. 14-42.

[4] Koners, U., Goffin, K. Learning from postproject reviews: A cross-case analysis (2007) Journal of Product Innovation Management, 24 (3), pp. 242-258

2.0) Case Research Approaches

2.1) What is Case Research

As with many linguistic terms, definitions of what a 'case study' specifically is abound. As a starting point, we can give a dictionary definition, from Oxford Dictionaries which defines a case study as:

"A particular instance of something used or analysed in order to illustrate a thesis or principle[5]."

Another, developed and used by Kathleen Eisenhardt is that:

"The case study is a research strategy which focuses on understanding the dynamics present within single settings."[6]

This interpretation is mirrored by Flyvbjerg:

"(The case is) *An intensive analysis of an individual unit (as a person or community) stressing developmental factors in relation to environment*"

These definitions both identify a case study as the investigation of a particular phenomenon in reality, although their reasons for such an investigation differ. In the former definition, such an investigation is undertaken in order to illuminate and help explain a particular point or theory being made. As such, the case study is designed to reinforce an existing argument. In the second instance, *a priori* assumptions about what information should emerge from the case study are absent. This illustrates an interesting point within case study research; that hypothesis can be both tested (when a hypothesis is developed prior to the case study research and evidence is sought through such research) as well as developed (when patterns emerge through looking at the information within the case studies).

Yin (REF) proposes that a case study is 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. He states that the case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as

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[5] Retrieved from Oxford Dictionaries on February, 4th, 2012.
[6] Eisenhardt, Kathleen M. Building Theories from Case Study Research. Academy of Management. The Academy of Management Review; Oct 1989; 14, 4; ABI/INFORM Global pg. 532

one result relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result

The benefits of case study research are that is allows researchers to investigate questions and causal relationships in situations where controlled experiments cannot be conducted. Also, the context and totality of complex phenomena (political, environmental, social, technological, legal, and economic) may not lend themselves to dissection into their component parts, because aspects of various phenomena (i.e. complex construction projects, national economies, or neighbourhoods within a city) are deeply interconnected. As such, the entire situation must be viewed in parallel with its other parts if they are to be made sense of. Contrary to experiments of physical sciences where a particular variable is isolated from other environmental conditions, there are times when this cannot be done. These times are when case study methods can be used to develop conceptual validity.

Case study research is good an answering 'how' and 'why' questions rather than the rate at which something happens or whether or not something happens at all, which are more suited to research methods such as surveys. While measuring the degree to which a particular even or decision resulted in a particular phenomenon might be better measured by surveying a group affected, understanding why a particular decision was taken, which was likely caused by a complex web of social, technological, environmental, economic and political circumstances is better investigated through a case study (Yin)

- Likelihood of generating novel theory by trying to understand and reconcile contradictions in evidence across the cases and between cases and literature.

- A hypothesis emerging from the case data is likely to be testable due to the fact that it was developed from the data rather than developed before any data collection commenced
Related to this is the fact that the theory is likely to be valid as it was developed on the basis of case evidence (Eisenhardt, 1989)

2.2 Perceived Weaknesses of Case based Research Approaches

Case-study research has its critics. These criticisms focus on:

1. The fact that a lack of methodological rigor that is often seen when case study approaches are used. At one time, this resulted from a lack of methodological guidance, but in the last 30 years, much research has been done to set protocols and standards of quality for conducting these types of exercises.

2. The idea that case study theories and results cannot be generalised as there are too many variables at play.

3. The issue in case study investigations that massive amounts of low-quality information are produced. This can be combated with the help of a well-defined research plan at the beginning of the research.

4. Standards for professional competence in conducting case studies have not been defined[7].

5. Researcher selection bias may incorrectly estimate the magnitude of causes on effects. This however is not unique to case study research and exists across all types of investigative inquiry[8].

6. Inability to know the statistical significance of particular variables on particular outcomes due to low sample sizes[9].

7. In these complex situations, it is difficult to identify which variables impact which results. Resultantly, theories may not be very useful as they attempt to explain everything in the case studies. In these cases, the theories are more summaries of a particular case than a theory with predictive qualities for other contexts[10].

2.3 Multi-Case Research

One of the ways in which the problems of single case research approaches can be ameliorated whilst still retaining the benefits of the approach is through the use of multiple cases. Multiple-case sampling adds confidence to the findings. As Miles and Huberman[11] (1994) state:

"By looking at a range of similar and contrasting cases, we can understand a single-case finding, grounding it by specifying how and where and, if possible why it carries on as it does. We can strengthen the precision, the validity and the stability of the findings. We are following a replication strategy. If a finding holds in one setting and, given its profile, also holds in a comparable setting but not in a contrasting case, the funding is more robust.

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[7] Yin, Robert K. Case Study Research: Design and Methods – Third Edition, pp. 6+7.
[8] Bent Flyvbjerg, 2011, "Case Study", in Norman K. Denzin and Yvonna S. Lincoln, eds., The Sage Handbook of Qualitative Research, 4th Edition (Thousand Oaks, CA: Sage, 2011), Chapter 17, pp. 314
[9] Ibid.
[10] Eisenhardt, Kathleen M. Building Theories from Case Study Research. Academy of Management. The Academy of Management Review; Oct 1989; 14, 4; ABI/INFORM Global pg. 546-547
[11] Miles, Matthew B.; Huberman, A. Michael. Qualitative Data Analysis – Second Edition, 1994

With multiple-case studies, does the issue of generalizability change? Essentially, no. We are generalising from one case to the next on the basis of a match to the underlying theory, not to a larger population. Nevertheless, the multiple-case sampling gives us confidence that our emerging theory is generic, because we have seen it work out, and not work out, in predictable ways."

Multiple-case designs have distinct advantages and disadvantages in comparison to single-case designs. The evidence from multiple cases is often considered more compelling, and the overall study is therefore regarded as being more robust. Interestingly, this latter way of looking at case studies in order to understand to cause phenomena to occur (or not) leads to the considering of multiple-case to confirm or disconfirm a suspected causal relationship. A definition which begins to bridge the gap between single and multiple case studies is that of one used by Flyvbjerg from Abercrombie, Hill and Turner, whereby:

"The detailed examination of a single example of a class of phenomena, a case study cannot provide reliable information about the broader class, but it may be useful in the preliminary stages of an investigation since it provides hypotheses, which may be tested systematically with a larger number of cases[12]."

Thus, while individual cases can illustrate instances of a particular phenomenon and help uncover suspected causal connections, we cannot derive theory from them. In order to do this, we must mobilise further case studies in the attempt to asymptotically approach *theoretical saturation.* This is the point at which the addition of cases to the portfolio under investigation is deemed unlikely to contribute further to the confirmation or disconfirmation of a particular hypothesis. Frankly, this is something of a judgement call, or perhaps better called an instinct felt by the case study analyst when they feel that both confirming and disconfirming evidence has been fully explored. Intriguingly, one expert in multi-case study analysis has proposed that theoretical saturation is usually reached when around 7-9 case studies are used.(Eisenhardt, 1989)

Additionally, it should be noted here that even when theoretical saturation is suspected, statistical data about the likeliness of a particular cause leading to a particular effect cannot be necessarily be extrapolated. There may be a tendency in case study research to try to generalise particular theories rather than keeping the scope of theory emerging from the case studies firmly within what the data allows. As a result of this caution should be exercised when trying to generalise the results of single

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[12] Bent Flyvbjerg, 2011, "Case Study", in Norman K. Denzin and Yvonna S. Lincoln, eds., The Sage Handbook of Qualitative Research, 4th Edition (Thousand Oaks, CA: Sage, 2011), Chapter 17, pp. 314

or multiple case analysis too far[13]. Multiple case confirmation of a particular theory will allow for some generalisation, particularly when the theory accounts for both confirming and disconfirming evidence. Naturally, however, this means that the findings of the analysis of each case study should be incorporated into the theory. This will likely have the effect of making the theory applicable to only a well-defined set of contextual conditions.

As with experimentation in the physical sciences, the idea of replicability is important in order to develop a firm basis for the findings. If a particular hypothesis is deemed to be true in one instance, this finding should be able to be reproduced in other similar instances. Taking this step further, other researchers should be able to look at the same data or data from similar case studies, and arrive at similar conclusions.

The use of multi-case approaches goes some way to resolving the issues of 'quality' referred to in the previous sub-section. Using multi-case can improve internal and external validity. In terms of internal validity, for explanatory or causal studies seeking to identify causal relationships and not spurious relationships, multiple-cases in an investigation allow cause and effect relationships to be investigated within a case portfolio. The degree to which a 'cause' or event actually happened, as with all empirical investigations, is inferred rather than undoubtedly known. Other causes must be considered as well as the degree to which an event occurred, before moving forward with analysis. These can be done by attempting to eliminate rival explanations before being confident that the theory under investigation is accurate, or at least the best one that can be arrived at that is firmly based on available evidence. More cases mean more exemplars of events from which to infer causal linkages. In terms of external validity, it is still important to note that case study research is not generalizable to a population or universe. Case study results are, however, useful when attempting to verify a theory in a particular context or set of contexts, but not about all other cases in the same field. For example, in the case of a complex project, a case may allude to the theory that those companies which do not invest in the local community to a certain predefined degree have greater local resistance and incidence of failures against predefined benchmarks. If they theory is supported in a particular instance, the theory can be used to identify other cases with similar dynamics and see if it still holds true. A lack of conflicting evidence further strengthens the evidence base supporting the theory but does not, it must be said, prove it. Replication is essential to achieve theoretical saturation and converge on a valid theory: replication is enables through the use of multi-cases.

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[13] Miles, Matthew B.; Huberman, A. Michael. Qualitative Data Analysis – Second Edition, 1994

It should be noted that Yin ( ) emphasises the need to ensure reliability and repeatability of case research investigation. This quality control mechanism helps to ensure that the findings of the study, in and of themselves, are linked to a logical path which leads from, the evidence. In this quality control metric, the question is whether another researcher conducting case studies analysing the same information could:

1) Follow the logic of the initial case study. This requires that the information which is captured is well documented and organised so that the path through it is relatively easy to follow for an expert.

2) Arrive at the same conclusions as the original investigator, by looking at the same information feeds. Another way of looking at this would be to see whether the original investigator could arrive at these same conclusions if they performed the research again. The key here is to make sure that a clear methodology and well-thought out case-study templates are developed from the beginning in order to allow for uniform, complete, and easy to understand data capture. Multi-case, as opposed to single case, approaches do not *de facto* bring any additional advantages to assuring reliability but the potential involvement of a greater number of researchers may assist in this process.

It is worth noting that multiple-case study analyses require extensive resources to implement. Resultantly, it is important that they are well designed in order to ensure they are completed using available means. This requires that the data to be captured within each case study, the selection of cases, and the quality of the finished case portfolio, are all well thought out and have protocols which are tightly followed. Every part of the case study portfolio should have a specific purpose. For example, after the conduct of an initial case study, cases should be selected to replicate this finding under the same or similar circumstances (perhaps with one or two contextual variables changed) in order to probe what may be causative, or simply correlative, relationships. If the same phenomena occurred when the context changed, the original theory may need to be revised in order to reflect this new information. Strengthening the theory can also occur as a result of identifying cases where it is predicted that the theory will not hold. If the theory does not hold under such circumstances, where the original theory predicts it will not, the predictive strength of the theory will be further strengthened. Using the idea of theoretical saturation discussed above, Yin suggests that 6 to 10 cases are selected. Of these, about a quarter of them would attempt to replicate the conditions of the initial case, and the rest would be selected to either test whether the theory holds when one or

more variables are changes or to show how the theory does not hold in cases where the variable in question is altered or non-existent[14].

Gien the resource intensive nature of multi-case research, the method may employ the use of 'secondary data'. In an investigation using secondary data[15]:

"the individual or group that analyses the data is not involved in the planning of the experiment or the collection of the data. Such analysis can be done based upon information that is available in the statistical information in the published articles, the data available in the text, tables, graphs, and appendices of the published articles, or upon the original data" (Church 2002).

Cowton (1998)[16] states that there are several advantages (such as cost and availability) (although some disadvantages) in the use of secondary data but

"as a general rule it seems to be the case that researchers are not as aware as they might be of the potential of secondary data for providing valuable insights into a whole range of questions in a costeffective manner [...] Two particularly valuable features of secondary data seem worthy of reiteration: first, the possibility of "eavesdropping", providing unobtrusive access to sensitive situations or to the past, [...] second, the way in which secondary data not only facilitate the pursuit of the empirical research agenda but also expand it as researchers perceive in datasets interesting research issues or novel avenues of enquiry."

There is a provenance of project management research using secondary data (Locatelli and Mancini 2012[17], Bas-Biemens et al 2004[18])

2.4 Cross-Case Analysis in Multi-Case Research

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[14] Yin, Robert K. Case Study Research: Design and Methods – Third Edition, pp 46-47.

[15] (Church, R.M. The effective use of secondary data (2002) Learning and Motivation, 33 (1), pp. 32-45.)

[16] Cowton, C.J. The use of secondary data in business ethics research (1998) Journal of Business Ethics, 17 (4), pp. 423-434

[17] (Locatelli, G., Mancini, M. Looking back to see the future: Building nuclear power plants in Europe (2012) Construction Management and Economics, 30 (8), pp. 623-637.)

[18] Hillebrand, Bas - Biemans, Wim G. - Links between Internal and External Cooperation in Product Development: An Exploratory Study - Journal of Product Innovation Management Vol 21 N 2 - Blackwell Publishing pp. 110-122; 2004

2.4.1 Definitions of Cross-Case Analysis

A key activity in multi-case research is the analysis across cases to identify replicability in experiences. Barratt et al[19] (2011) define 'cross-case analysis' as the act of comparing and contrasting the patterns emerging from a range of cases. It is one for the key tool in the process of theory building from case studies (Eisenhardt[20] 1989). Cross-case analysis is used to extend the knowledge above the single case prompting new questions, seeking new dimensions, measuring alternatives, creating models, and constructing ideal types and utopias[21] (Stretton 1969). Cross case analysis is fundamental to understand "how" relationships may exist among discrete cases, accumulate knowledge on the original case, refine or develop concepts (Ragin 1997) [22] and build or test theory further (Eckstein, H. (2002)[23].

2.4.2 Inductive vs. Deductive Approaches

Before conducting the analysing process it is to decide whether an inductive or a deductive approach (or both) will be used. These approaches influence particularly the pattern spotting philosophy. The criteria for selecting between these approaches could be the nature of the research problem, the research design and the research aim.

The inductive approach intends to "develop new theory from the observation of empirical reality" (Gill, Johnson, 2002). Thus, the researcher commences analysis by exploring. The identified relationships are examined in the context of each case. For high qualitative results of an inductive approach, it is essential trying to use different lenses in order to shape new constructs. This can be achieved when these new constructs are tested and revised against the evidence of each of the cases over and over again. Meanwhile, the deductive approach "entails the development of a conceptual

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[19] Mark Barratt, Thomas Y. Choi, Mei Li, Qualitative case studies in operations management: Trends, research outcomes, and future research implications, Journal of Operations Management, Volume 29, Issue 4, May 2011, Pages 329-342

[20] P Building Theories from Case Study Research Kathleen M. Eisenhardt The Academy of Management Review , Vol. 14, No. 4 (Oct., 1989), pp. 532-550)ages

[21] (Stretton, H. (1969). The political sciences: General principles of selection in social science and history. London: Routledge & Kegan Paul.).

[22] (Ragin, C.C. (1997). Turning the tables: How case-oriented research challenges variable- oriented research. Comparative Social Research, 16, 27-42.),

[23] Eckstein, H. (2002). Case study and theory in political science. In Gomm, R., Hammersley, M., & Foster, P. (Eds.), Case study method: Key issues, key texts (pp. 119-163). London: Sage Publications).

and theoretical structure that is then tested by observation" (Gill, Johnson, 2002). Thus, the researcher starts with some propositions derived from existing literature or from the analysis of the research problem. This approach basically intends to test general explanations by checking each of the cases for evidence. Furthermore, it aims to give more detailed and fine-grained explanations than the available knowledge is able to do.

The difference between the inductive and deductive approach will be explained here in the context of the MEGAPROJECT investigation (which is described in more detail in the next section). The aim of this research project is to understand the cross-sectoral performance of European megaprojects. A multi case study was conducted to investigate this. As megaprojects basically could be considered as related to 'normal' projects, existing project management theory could be used as the starting point in a deductive approach to cross-case analysis. Thus, when pattern spotting across cases, firstly, available theories could be addressed and propositions derived from these. These theoretical propositions would then be examined against the experience of each megaproject cases. Subsequently, explanations for 'normal' projects would be used to identify the causes and effects for the performance of megaprojects. The logic of this approach is presented in Figure 3.

An inductive approach would start without consideration of project management theory and would focus on the megaproject cases themselves. When the analysis of cases revealed patterns, new theoretical explanations would be postulated and then compared with already existing project management theory in order to enrich the new emerging theory further. This logic is presented in Figure 4.
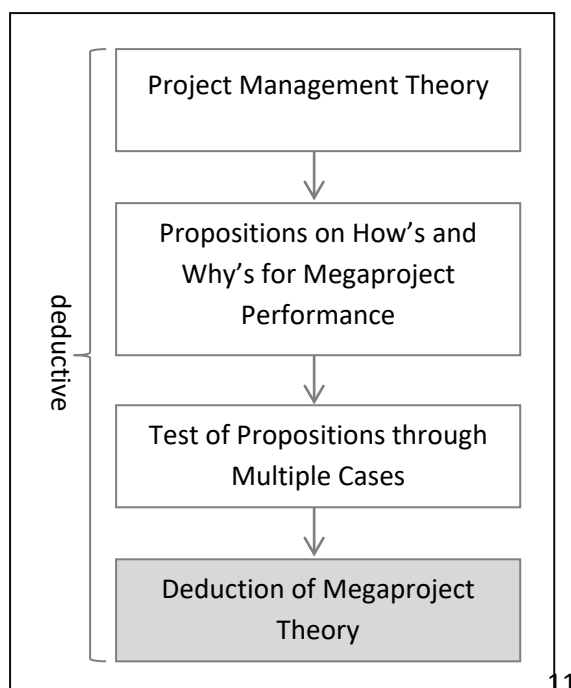

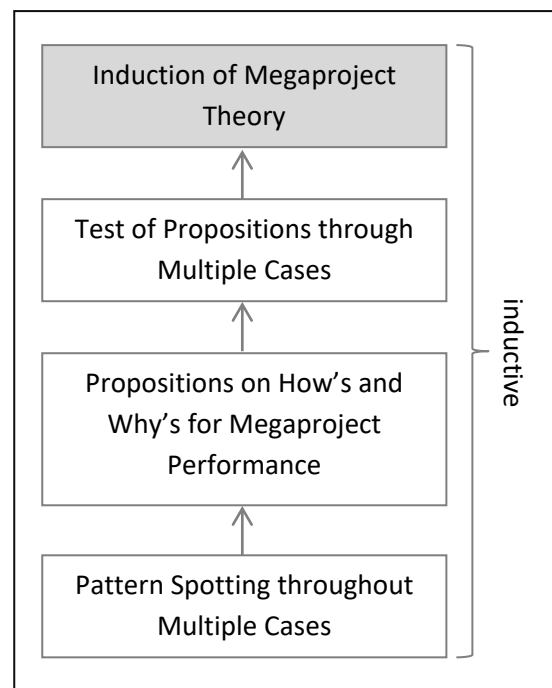Figure 3: Example for Deductive Approach in Cross-Case Learning

Figure 4: Example for Inductive Approach in Cross-Case Learning

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Current literature highlights the benefits of using a more inductive approach to theory generation(Locke 2007) (Heracleous and Lan 2012) especially in terms of their sensitivity to institutional issues though this is balanced by pleas for a more 'pluralist' approach (Welch, Piekkari et al. 2010). However it may be erroneous to focus on the dichotomy between an 'inductive' and 'deductive' approach. As Parke states:

"In reality, of course, there is no competition, but rather an essential continuity and inseparability between inductive and deductive approaches to theory development."(Parkhe 1993)

Indeed the reality (and desirability) of the case research activity is recognised as a 'cycling' of inductive-deductive approaches in a wide variety of diverse contexts including organizational process research, international business and healthcare studies(Orton 1997) Hyde 2000) (Fereday and Muir-Cochrane 2008). A strong coalescence of thinking indicates that case research requires a much more self-aware and contexturalized approach to theory generation recognising the approaches adopted to theory creation (Barratt, Choi et al. 2011) (Dubois and Gibbert 2010) (Piekkari, Welch et al. 2009)

2.4.3 Approaches to Cross-Case Analysis

Two of the most widely used approaches to cross-case analysis are provided by Yin (2003) and Eisenhardt (1989) and are discussed in detail below. It should be noted that cross-case analysis only forms part of the whole multi-case approach recommended of each of the authors.

Yin's process to case study analysis (Yin, 2003) comprises three phases: firstly, the selection of an adequate analysis strategy; secondly, the selection of an analysing technique and ,finally considerations on how to ensure high qualitative research results (Figure 1). Basically, this approach

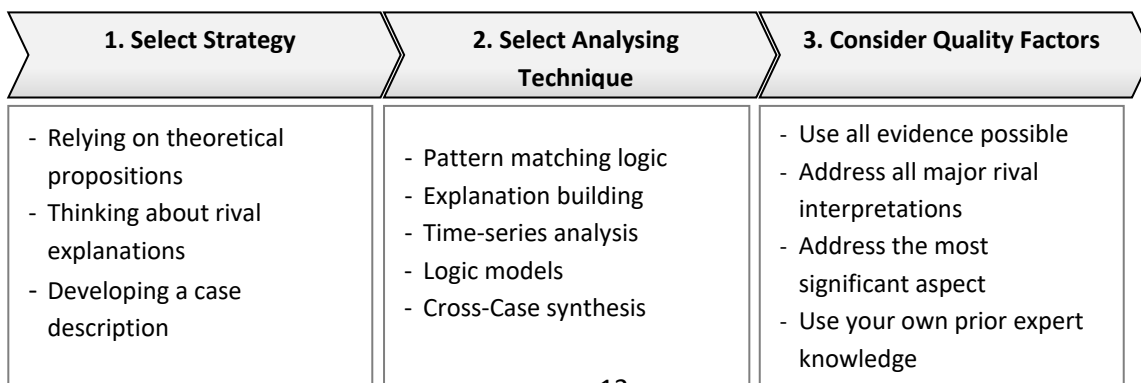| 1. Select Strategy	2. Select Analysing Technique	3. Consider Quality Factors
- Relying on theoretical propositions - Thinking about rival explanations - Developing a case description	- Pattern matching logic - Explanation building - Time-series analysis - Logic models - Cross-Case synthesis	- Use all evidence possible - Address all major rival interpretations - Address the most significant aspect - Use your own prior expert knowledge

Figure 1: Yin's (2003) approach to analyse multiple cases

directs the user first to choose between the general strategic directions of the intended use of the expected results. (i.e. Are they to support theoretical propositions? Are they to refute rival explanations? Are they to be used in a descriptive way?) This general strategy will influence the way of dealing with the cases and the choice of techniques for the analysis.

Choosing the pattern matching logic – one of the techniques for cross-case analysis – enables the researcher to test whether predicted patterns match with the data from the cases. The explanation-building technique can be used when a phenomenon is trying to be explained through multiple cases. This process starts with an initial theoretical statement or proposition which is to be confirmed and if necessary revised by the first case, followed by all the others.

Time-series analysis is to use in order to understand the phenomenon studied in a temporal context. This context might be a simple or a complex one, describing clear or ambiguous developments. Further, a chronological analysis of events might also be applied in time-series analysis (c.f. Yin op.cit.).

With 'logic models' – which are akin to pattern matching logic – events are described as cause-effect-cause-effect-patterns. Logic models are also used to test the observed results against theoretically predicted ones. The last technique is the cross-case synthesis and this is of particular interest in multi case studies as it includes a 'side-by-side' comparison of the cases' content.
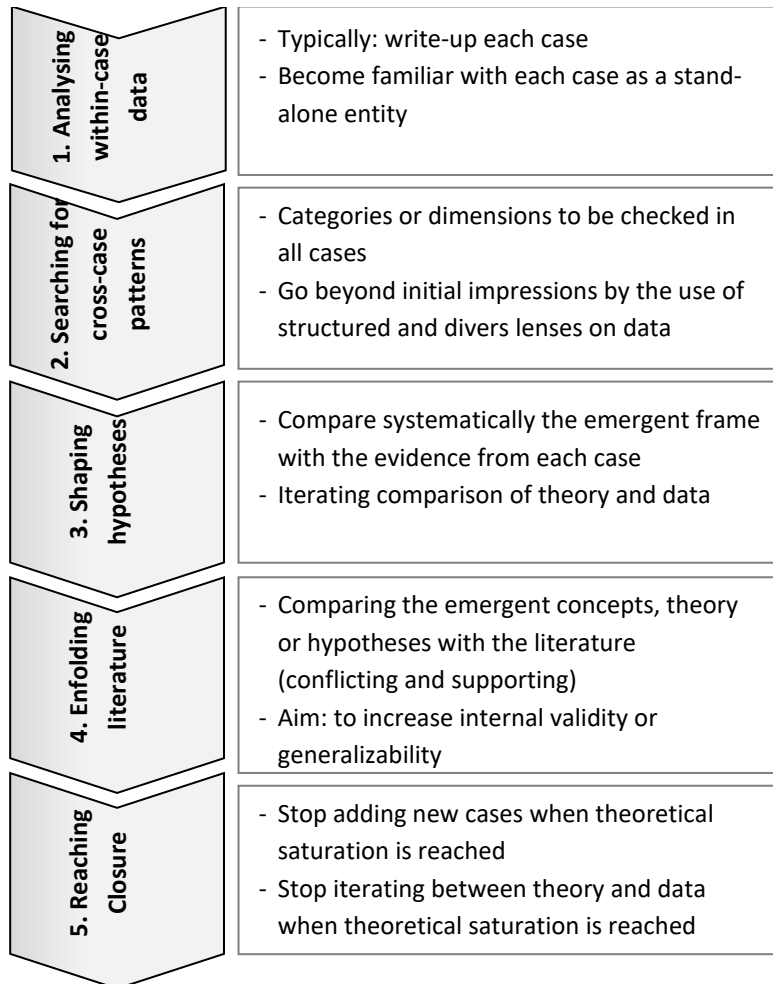
The last steps of Yin's approach to analyse multiple cases is 'a quality gate' which reminds the researcher to consider several aspects. First, the strength of evidence is absolutely crucial to the quality of results. Therefore, all possible sources of evidence should be used. Second, good results hold up with rival interpretations. These should be mentioned and explained of refuted if necessary. Third, high-quality case studies focus on the most significant aspect of the phenomenon analysed. This is not easy to keep in mind as various other aspects might emerge during the analysing process. And last but not least, the researcher's knowledge and experience might enrich the results and should therefore pour in.

The other popular approach to cross-case analysis provided by (Eisenhardt, 1989) describes five steps which include first, analysing within-case data; second, searching for cross-case patterns; third, shaping hypotheses; fourth, enfolding literature; and fifth, reaching closure (Figure 2).

Eisenhardt (1989) emphasises in the first step the need to write-up each case in order to understand each of the cases before relating them to each other. Then, the search for cross-case patterns can be initiated by selecting interesting categories or dimensions which play a role in the problem that is addressed. They could first be checked within similar groups among the whole sample of cases and

then across the total sample, in order to go beyond initial impressions. Similarities and difference between cases could lead to further insights as well as the arranging of data by sources.

The third step, shaping hypothesis, is a crucial point and basically consists first, of sharpening the constructs by an iterative comparison of emerging frames and the data and second, of verifying these constructs with the proper evidence of the analysed cases.

1. Analysing within-case data	- Typically: write-up each case - Become familiar with each case as a stand-alone entity
2. Searching for cross-case patterns	- Categories or dimensions to be checked in all cases - Go beyond initial impressions by the use of structured and divers lenses on data
3. Shaping hypotheses	- Compare systematically the emergent frame with the evidence from each case - Iterating comparison of theory and data
4. Enfolding literature	- Comparing the emergent concepts, theory or hypotheses with the literature (conflicting and supporting) - Aim: to increase internal validity or generalizability
5. Reaching Closure	- Stop adding new cases when theoretical saturation is reached - Stop iterating between theory and data when theoretical saturation is reached

Figure 2: Eisenhardt's (1989) approach to learn across multiple cases

Enfolding literature, as the fourth steps, basically connects the gained results or hypotheses to the literature. It is important to relate them to both, supporting and conflicting literature. Thus, the research enriches existing knowledge and increases its on validity.

The last step, reaching closure, consists of the realisation that more cases should be added and the analysis of cases can be stopped, as no further insights are likely to be arrived at. If no new insights can be expected despite the addition of new cases, then saturation is reached, and closure of the analysis can be justified.

In terms of learning across cases, Yin's and Eisenhardt's approaches to case study analysis provide a systematic and easy-to-follow instruction for researcher. However, their approaches reinforce the understanding that case study research in general and the analysis process specifically is a skill that needs to be trained and developed by application.

3.0 Using A Multi-Case Approach in Project Management Research: The MEGAPROJECT investigation

3.1 Background to the MEGAPROJECT investigation

The MEGAPROJECT investigation was undertaken under the auspices of the COST Action programme funded by the European Science Foundation[24]. The aim of the COST Action programme is to develop the European Research Area through supporting groups of researchers in networks. The aim of the MEGAPROJECT COST Action is to understand how megaprojects can be designed and delivered more effectively to ensure their effective commissioning within the European Union. The objectives of the EGAPROJECT investigation are:

- To conduct a 'meta' cross-case analysis of groups of megaprojects delivered within Europe and to identify common thematic issues relating to megaproject design and delivery from across the disciplinary spectrum.

- To categorise those thematic issues into those issues for which sufficient evidence exists to make immediate policy and practice recommendations and those issues which require further research
    - To produce a 'state of the art' series of guidelines for key issues surrounding the effective design and delivery of megaprojects
    - To produce a research agenda that is made accessible to key stakeholders

In undertaking this investigation the MEGAPROJECT COST Action has two prime research questions:

- Why do megaprojects perform in the way that they do?
- What can we do to make them perform better?

Underlying these research questions is the premise that megaprojects have common experiences regardless of the sector in which they operate.

The researchers undertaking the MEGAPROJECT investigation comprise a large multi-disciplinary and multi-cultural group with very disparate levels of research experience. The researchers from 22 Euroepan countries include professors, doctoral researchers, consultants and practitioners from disciplines as diverse as Civil Engineering, Construction, Architecture, Project and Programme management, Town Planning, Economics, Transport Studiesand Management, Contract Management and Law, and Production and Operations Management . This diversity in the researcher investigating MEGAPROJECT was compounded by their dispersal across Europe during the course of the project.

3.2 The Multi-Case Research Approach Utilised in the MEGAPROJECT investigation

The design of the MEGAPROJECT investigation approach was highly reliant on the concepts and processes outlined in Yin (2004). The unit of analysis of the investigation was taken to be a

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[24] For further information, please see www.mega-project.eu

megaproject. This was interpreted as a large infrastructural project that had a total budget of a minimum of the region of 1 billion dollars or €0.75bn euros. The boundaries of the megaproject were delineated through a systemic consideration which also was employed in creating the protocol template.

The decision to pursue a multi-case approach (rather than using a single case) was almost one of necessity given the premise of the MEGAPROJECT investigation namely that common experiences exist in megaprojects regardless of the sector in which the megaproject operates. The investigation thus employed a sampling logic consistent with this proposition: the sample of cases in the MEGAPROJECT portfolio aimed to include as many sectors as possible. Megaprojects were therefore included in the portfolio from sectors including power generation (nuclear, conventional and renewable), transport (rail, air, sea and road), water provision and flood protection.

Fundamental to insuring the quality of the research (especially in terms of construct validity and reliability) was the development of a protocol for the investigation. The demands on the transparency and usability of this protocol were significant given the highly disparate group of researchers that used it. The case protocol comprised two elements:

- instructions on the data collection processes to be used in the investigation
- a standardised template in which to capture and codify the data

These elements were co-designed by the investigation's researchers in a workshop and then piloted in selected case scenario. The results of the pilots were feedback to a core team of researchers that amended the protocol and communicated the revised version to the rest of the investigations researchers. Data collection processes involved the use of secondary data that originated either from previous primary research investigations undertaken by the researchers or from publically available data such as government reports, trade press articles etc. The template utilised systemic thinking to categorise the megaproject (c.f Checkland[25] 1980, Jenkins 1981[26]). It used the constructs of actors (or system elements) linked together by relationships and engaged in activities that join together into transformation processes. This bounded megaproject system was judged to operate in a wider environment (political, legal and economic) and to possess emergent properties (viewed both in

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[25] Checkland P.B, "Systems Thinking: Systems Practice", Wiley NY 1981

[26] Jenkins G "The Sysytems Approach," in "Systems Behaviour" ed. Open University Systems group, Harper and Row, London 3rd ed 1981 pp142-168

terms of cost, time and performance of the megaproject and the degree to which it satisfied its stakeholders' requirements. The data gathered by the researchers was used to complete the template and used footnotes at the end of the template to indicate the source of each data item. The completed templates were then made available to all of the researchers in the Action via an open-access website and in a searchable format in what was termed the MEGAPROJECT Case Portfolio

The investigation founded its approach to analysis of the cases on the principle of triangulation. Gill and Johnson (2010) define this as follows:

"*Triangulation, in social science research methodological terms, allows for verification of postulated relationships through several different approaches performed by different researchers at different points in time arriving at the same conclusions*"

Sub-groups of researchers were created to use different approaches to analysing the cases to identify emergent themes that could be postulated as impacting on megaproject design and delivery performance. Thus sub-groups employed both inductive and deductive approaches to pattern spotting across the Portfolio. Some sub-groups followed the process proposed by by Eisenhardt (op. cit), others utilised a semantic based approach to ratifying deductively generated propositions. The themes that were generated by the sub-groups were then brought together at a workshop in which they were grouped into meta-themes and ordered in terms of the impact on megaproject performance using a Delphi exercise undertaken by all of the researchers in the MEGAPROJECT investigation.

3.3 Reflections of the Outcomes of the Multi-Case Investigation

Through the triangulation exercise, the following emergent meta-themes were identified as substantively impactive on megaproject management performance:

- Managing external stakeholders
- Creating appropriate governance and structure
- Shaping and responding to the political and regulatory environment

In the context of this chapter, it is important to understand how these themes are different than those that would have arisen from considering a singular case. Firstly, their extendibility is greater as they have been found across megaproject sectors in Europe rather than one particular situation in

one sector in one country. This gives confidence to the users of the outcomes of the MEGAPROJECT research (many of whom are practice based) that considering these meta-themes in designing and delivering a wide range of European mega-projects is appropriate. Secondly, the evidential support from a wide variety of cases enabled a much richer and nuanced exposition of the meta-theme. This included the ability to both *literally* replicate case situations but also to *theoretically* replicate situations (c.f. Yin 2006).

The MEGAPROJECT Project also provides the opportunity to learn from the operational aspects of multi-case research. As has been discussed previously in this chapter, multi-case research is resource intensive and, of necessity, may involve many researchers and potentially the use of secondary data. The success of the MEGAPROJECT template in inculcating a uniform approach to case creation was instrumental to the efficacy of a multi-case research approach. The template enabled a highly disparate group of researchers to work together under the auspices of a single investigation. This suggests that a similar approach to multi-case protocol implementation may meet with equal success (assuming that the case template was well-designed.) The use of secondary data did not prove problematic either but it did entail the creation of a very specific 'glossary' for the terminology used in the project to insure a consistent interpretation of the constructs under investigation.

Acknowledgements