

CHAPTER 5

RESEARCH DESIGN

5.1 Components of Research Design

For case studies, five components of a research design are especially important (Yin, 2003):

1. A study questions
2. Its propositions
3. Its unit of analysis
4. The logic linking data to the propositions
5. The criteria of interpreting the findings

It is highly recommended to construct a preliminary theory related to the research topic in order to effectively fulfil the preceding five components of research designs (Yin, 2003). It is wise to have a prior view of the general constructs and concepts under investigation and their relationships (Voss, Tsikriktsis, & Frohlich, 2002). Hence, the starting point for case study research is the research framework, constructs, and questions (Voss et al., 2002). Generally, the research framework, constructs and questions are built on the objectives of the study and the existing literature as well. It should be noted that developing a framework and determining research questions is essential whether the study intends to develop a new theory or test/refine an existing theory.

The first components of the research design for this research and the development of conceptual framework, constructs and research questions are explored in chapter two and three based on literature review.

However, for the second component which is propositions; the researcher take different way of designing this research where there were no proposition development after literature reviewed. The researcher believes that since this is an exploratory nature of research, the development of theories will be found after all components in

research design is achieved. Because of that, the ‘propositions’ will be developed after the cases has been analyzed where it becomes the findings of this research. Maxwell, (2004) mentioned that design in qualitative research is an ongoing process that involves “tacking” back and forth between the different components of the design, assessing the implications of goals, theories, research questions, methods, and validity threats for one another. It does not begin from a predetermined starting point or proceed through a fixed sequence of steps, but involves interconnection and interaction among the different design components.

The third component of the research design is related to the problem of what the case is; the research unit of analysis. The research unit of analysis could be identified as the object, event, entity, individual, decisions, programs, implementation process, etc. under investigation and stems directly from the research questions and constructs. Thus, the research unit of analysis in this research is *a set of collaborative decisions* that has been made in supply chains..

The fourth and fifth components in the research design process are related to the collection and analysis of data and evaluation of the findings from the case studies. These components will be discussed later in this chapter. From the preceding discussion it could be concluded that once research framework, constructs and questions are elaborated, it will allow to clearly specify the research questions and unit of analysis of the research.

The strategy for the research in this study used the framework proposed by Maxwell (2004) for qualitative research design. The framework is intended to give structure to the research process, whilst being flexible enough to allow for interactive changes to its various elements as the research progresses. It comprises of five interrelated elements (Figure 5.1); goals, conceptual framework, research questions, methods and validity, each of which will now be discussed in the context of this work.

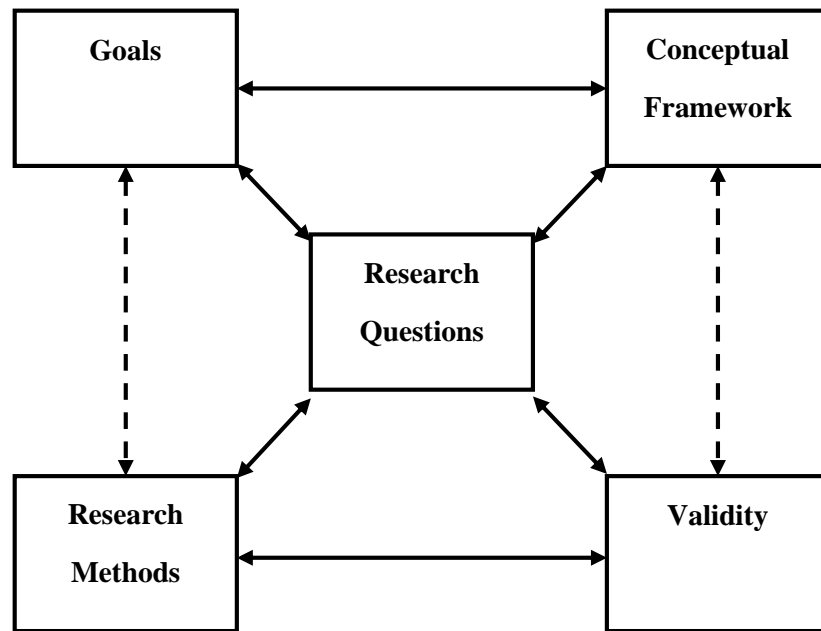


Figure 5.1. An Interactive Research Framework (Maxwell, 2004)

5.2 Goals, Conceptual Framework and Research Questions

An Interactive Research Framework design by Maxwell (2004) contains of five components as describe below:

Table 5.1 Descriptions of components in Interactive Research Framework (Maxwell, 2004)

Research Components	Descriptions
Goals	<ul style="list-style-type: none"> • Why is your study worth doing? What issues do you want it to clarify, and what practices and policies do you want it to influence? • Why do you want to conduct this study? • Why should we care about the results?
Conceptual Framework	<ul style="list-style-type: none"> • What do you think is going on with the issues, settings, or people you plan to study? • What theories, beliefs, and prior research findings will guide or inform your research? • What literature, preliminary studies, and personal experiences will you draw on for understanding the people or issues you are studying?

Research Questions	<ul style="list-style-type: none"> • What, specifically, do you want to understand by doing this study? • What do you not know about the phenomena you are studying that you want to learn? • What questions will your research attempt to answer, and how are these questions related to one another?
Methods	<ul style="list-style-type: none"> • What will you actually do in conducting this study? • What approaches and techniques will you use to collect and analyze your data? • There are four parts of this component of your design: <ol style="list-style-type: none"> 1. The relationships that you establish with the participants in your study. 2. Your selection of settings, participants, times and places of data collection, and other data sources such as documents (what is often called “sampling”). 3. Your data collection methods. 4. Your data analysis strategies and techniques.
Validity	<ul style="list-style-type: none"> • How might your results and conclusions be wrong? • What are the plausible alternative interpretations and validity threats to these, and how will you deal with these? • How can the data that you have, or that you could potentially collect, support or challenge your ideas about what’s going on? • Why should we believe your results?

Sections below will describe the research components in the context of this research:

5.2.1 Goals

Maxwell (2004) defines goals as the reasons for doing the research, why it is worth doing and what issues will be clarified by doing it, and has divided these into personal, practical and intellectual goals. The personal goals relate to the motivation of the researcher to pursue the chosen line of inquiry, practical goals relate to the need that the research aims to address and intellectual goals are set to ensure the research study makes a theoretical contribution in the area. The overall goals of this research is to extent theory on the impact of adopting of E-Collaboration Technologies in

collaborative decision-making from supply chains context with relation to the decision-making styles and the task types. Deconstructing this into Maxwell's three types of goals as in Figure 5.2 below:

RESEARCH GOALS

1. Personal goals of the researcher are to examine the impact of ICT; specifically the E-Collaboration Technologies to the business process namely decision-making as well as to complete her doctorate as a means to build a career in academia.
 2. Practical goals are to give directions to practitioners specifically in the area of collaborative decision-making in supply chains towards the impact of E-Collaboration Technologies to the efficiency, effectiveness and trust development in collaborative decision-making in supply chains.
 3. Intellectual goals and contribution to theory are this research will provide insight into the adoption of E-Collaboration Technologies in collaborative decision-making, and discussion as to how contextual factors, social factors and impact of technologies adoptions influences the process of collaborative decision-making.
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Figure 5.2 Research Goals

5.2.2 Conceptual Framework

The conceptual framework provides the constructs of the research topic, the 'what' elements to consider when striving to answer the research questions and fulfil the research goals. The conceptual framework for this work was presented as the conclusion of the exploratory literature review in Chapter 3, which was guided in its direction by the research goals.

5.2.3 Research Questions

The research questions are central to the research design and clarify exactly what the researcher wants to discover by conducting the study. Three research questions were stated in Chapter Two, following discussions of the background to the study, exploratory literature review and exploratory case study. Hence, these questions were formed from the research goals and conceptual framework, demonstrating the linkage between these three elements of Maxwell's framework (2005).

5.3 Research Methods

The fourth, and arguably most important element of any research design is how the research questions will be answered. The 'methods' element of the framework suggested by Maxwell (2005) includes methodology (the strategy for data collection and analysis), as well as methods (the tools and techniques used to collect and analyze data). This research is exploratory in nature due to the fact little is known about the impact of E-Collaboration Technologies on the development of inter-organizational trust in the context of collaborative decision-making.

5.3.1 Case Study Design Addressing This Study

Case study design is about planning how you are going to address the study and make sure that all collected data is relevant. It involves three key decisions that the researcher has to think about once they decided to start empirical investigation; *case selection, data collection and data analysis*.

5.3.1.1 Case Selection

There are two fundamental decisions confronting researchers in identifying candidate cases; how many cases to include and how to select cases to address the research questions. Generally, the number of cases could be differentiated as single case versus multiple cases design.

The major determinant in selecting a single case strategy is the degree of resources availability. The single case study is an appropriate strategy under five circumstances (Yin, 2003):

- When it represents a critical case in testing a well formulated theory.
- When the case represents a unique case.
- When it is a representative or typical case.
- When it is a revelatory case
- When it is a longitudinal case

It could be identified that once the rationale for single case designs could not be substantiated; it will be wise for a researcher to switch to multiple cases design. Although multiple cases design has advantages and disadvantages in single case design, the evidence from multiple cases often provides more compelling evidence, the overall study is regarded as being more robust (Yin, 2003) and it provides better opportunity to generalize research findings (improving external validity). Thus, this research adopts a multiple case study design to provide more rigor and robust research. In multiple case studies, a vital question is how cases are selected. As Yin (2003) identified, every case should serve a specific purpose within the overall scope of inquiry (Yin, 2003). The logic underlying case selection in multiple case studies is either to predict similar results (a literal replication) or to predict contrasting results for predictable reasons (theoretical replication) (Yin, 2003).

In this research study, the researcher decided to deploy multiple case studies in two types of collaborative supply chain initiatives; five case studies for ‘Service Supply Chain’ and three case studies for ‘Manufacturing Supply Chain’. The main aims behind this strategy is to explore how can E-Collaboration Technologies able to assist or become a barrier in making decision collaboratively and to identify factors that contribute to trust development in different types of collaborative decision with regards to adoption of E-Collaboration Technologies.

There are several criteria for case study selection. The research is focused on a set of collaborative decisions as the unit of analysis, thus potential cases must fulfil a number of criteria as in table 5.2 below.

Table 5.2 Case Studies Characteristics

Case studies characteristics	CS1	CS2	CS3	CS4	CS5	CS6	CS7	CS8
<p>1. The project must be a collaborative project involves:</p> <ul style="list-style-type: none"> • Collaboration between several different organizations. • Collaboration in the same organization but between different departments. 	√	√	√	√	√			
<p>2. The project must involve collaborative decision-making according to the definition proposed by the researcher; collaborative organizations make decisions together and a moment in an ongoing process of evaluating alternatives for meeting an objective.</p>	√							
<p>3. The project must involve E-Collaboration Technologies or any internet-based tools as a medium of communication in the decision-making process.</p>	√							
<p>4. E-Collaboration Technologies that potentially adopted in Service Supply Chain such as video conferencing tools, instant messaging, online meeting tools etc.</p> <p>The ‘supply chain’ decisions involved in this cases are in terms of supplying information and expertise between the key decision-makers involved in this specific issues.</p>	√	√	√	√	√			
<p>5. E-Collaboration Technologies that potentially adopted in Manufacturing Supply Chain such as ERP system, EDI, CPFR etc.</p> <p>The ‘supply chain’ decisions involved in this cases are in terms of supplying tangible goods to suppliers and customers.</p>						√	√	√

The potential companies or projects were contacted by email or phone to invite participation in this research project. The key decision-makers were identified and after the agreement, the researcher started to discuss what types of collaborative decision-making they made and if it is suitable, interview were to proceed. Table 5.3 shows which case were selected to take part in this study, and why each of the cases has been decided as a suitable case for inclusion within this study.

Table 5.3 Selected case study unit of analysis

Case Study – Unit of Analysis	Reason for inclusion -- Why the cases were chosen? --
Case Study 1	The key decision-makers who involved in this collaborative decision were located in different places across Europe and the main method of communication were using GoToMeeting; an online meeting tool. GoToMeeting is used as a tool for video conferencing, transferring files as well as medium for virtual discussion between the key decision-makers. Moreover, they were making decisions in strategic level of service supply chain.
Case Study 2	The key decision-makers who involved in this collaborative decision were located across Europe and in different organizations. The method of communication was online and face-to-face meeting for every 3 months. Level of decision-making was on an operational level.
Case Study 3	The collaborative decision involved in this case was at a strategic level. This decision adopted E-Collaboration Technologies in their follow up process only and not become the main method of communication even though they were located in different locations. This was because of the complexity of the decisions. This case was one of the interesting case that provides an example of how an effective decision cannot be made through E-Collaboration Technologies.
Case Study 4	The collaborative decision involved in this case was at strategic level. The key decision-makers adopting E-Collaboration Technologies as a tool to transfer information and not in terms of communication. This

	is because the nature of the decision which requires creative solutions. This case provides a good example of how E-Collaboration Technologies actually enable or disable decision-making in this type of decision.
Case Study 5	The collaborative decision involved in this case was at a strategic level. This collaborative decision involves creative solutions and provides a good example of how E-Collaboration Technologies enable or disable decision-making in this type of decision.
Case Study 6	The collaborative decision involved in this case was at a strategic level. The collaboration takes parts between different departments in the same organization. This decision provides an interesting example of how adoption of E-Collaboration Technologies enable or disable collaborative decision-making.
Case Study 7	The collaborative decision involved in this case was at a strategic level. This decision involves collaborative relationships between manufacturer and suppliers and how the adoption of E-Collaboration Technologies in the context of manufacturing supply chain able to assist the collaborative decision-making in this specific decision.
Case Study 8	The collaborative decision involved in this case was at operational level. This decision involves collaboration between manufacturer, customers and suppliers where the same of E-Collaboration Technologies were adopted in the business process tools. This decision provides an interesting example on how information from the adopted technology can assist decision-makers to make effective decision-making.

5.3.1.2 Data Collection

Data collection in this case study research mainly consists of two main steps; preparation for data collection and the means for data collection or collecting the evidence.

During the preparation for data collection, the researcher developed case study protocol to serve both as a prompt for the interview and as a guide to make sure that all topics will be covered. Typically, a case study protocol should include an overview of the case project, field procedures, case study questions and a guide for the case study report (Yin, 2003). The protocol comprises the instrument as well as the procedures and general rules to be followed while gathering the needed information from case studies. In addition, it indicates who or from where different sets of information are to be sought (Voss et al, 2002). Designing case study protocols are very useful and helpful in conducting multiple case studies and collecting data in a robust, reliable and repeatable manner. As a final preparation step for data collection, the researcher conducted a pilot case study to try the suitability of the protocol on 21/07/2011. This helped in refining data collection plans with respect to both the content of the data and the procedures to be followed (Yin, 2003). After the preparation of a case study protocol and a pilot case trial, it is time for the actual collection for field data; collecting the evidence.

The interview process overall took about 9 months to be completed as the researcher had gone through the difficult process of identifying the organizations for case studies at the earlier phase of data collection. Eventually, the researcher had cooperation from the Future SME project which manage the Service Supply Chain collaborative project and Highland Spring for Manufacturing Supply Chain collaborative project. The interview process for Service Supply Chain was done through face-to-face meeting and Skype interviews. Since some of the interviewees were located across Europe, Skype interview was the most effective way to do interview. Moreover, in some conditions, the researcher had to interview the same interviewee but for different types of collaborative decisions since he or she had involved in more than one decision-making process. This condition also had taken quite considerable amount of time since in certain conditions, the researcher needs to arrange more than one interview with the same person. Overall, it took about 1 ½ hour to complete the interview with each and every interviewees.

For the Manufacturing Supply Chain interview, it was held at Highland Spring office in Blackford, Scotland on November 2012. Interview with Head of Supply Chain and

Demand Manager was conducted via Telephone, while interview with Customer, Supply and Logistics Manager conducted face-to-face. During the interview, the researcher had asked an open ended questions surrounded in the area of collaboration activities. The main concerned during the interview was to asked questions on what types of collaborative decisions involved in their supply chain activities, who are their customers and suppliers and what types of E-Collaboration Technologies they are using to help the company’s operations and decision-making process. The researcher managed to interview the Customer Supply and Logistics Manager, the Head of Supply Chain and the Demand Manager who involved in each and every aspects of the collaborative activities with their customers and supplier.

Table 5.3 below represent the list of interview questions during the data collection session with both collaboration projects.

Table 5.3 Summary of data collection

Case Study	Company Name	Interviewees	Date	Durations	Questions asked
CS 1 Decision on a non-performing partner	Strathclyde University (UK)	Project Director	11/11/2011	1 ½ hour	<ol style="list-style-type: none"> 1. In your position, what is your roles and responsibility as a whole in the company and specifically in the decision? 2. What are the types of collaborative decisions have been made in this area? <ul style="list-style-type: none"> • How was the decision made? 3. What is the process? 4. What are the types of E-Collaboration Technologies
	Tsunami (Ireland)	Project Manager	2/12/2011	1 ½ hour	
CS 2 Decision on development of ‘Adaptive Capability Model.’	Strathclyde University (UK)	Content Project Manager I	10/12/2011	1 ½ hour	
	Tsunami (Ireland)	Content Project Manager II	13/2/2012	1 ½ hour	
CS 3 Decision on choosing the ‘Sitefinity’ software as a portal platform.	Simply Collaboration (UK)	IT Project Manager	3/2/1012	1 ½ hour	
	Strathclyde University (UK)	Project Manager	14/10/2011	1 ½ hour	

	Technical University of Ostrava (Czech Rep.)	Project Coordinator	8/2/2012	1 ½ hour	<p>involves in decision-making process? Do you use any electronic communication technologies to assist the collaborative decision-making in this area? What are they?</p> <p>5. Do you think a better and faster decision would have been made with or without E-Collaboration Technologies? Why?</p> <p>6. Do you think a better decision can be made using E-Collaboration Technologies or a better decision can be made using conventional method such as face-to-face?</p> <p>7. How important do you think trust between members in this collaborative initiative and why?</p> <p>8. Do you think E-Collaboration Technologies helps or hinder building trust?</p>
CS 4 Decision on development of logo and design.	Strathclyde University (UK)	Content Project Manager I & Project Director	28/11/2011	1 ½ hour	
			11/11/2011	1 ½ hour	
	Simply Collaboration (UK)	IT Project Manager	3/2/2012	1 ½ hour	
CS 5 Decision on development of portal 'Wheel' design.	Strathclyde University (UK)	Content Project Manager I	11/1/2012	1 ½ hour	
	Simply Collaboration (UK)	IT Project Manager	3/2/2012	1 ½ hour	
CS 6 Decision on investment on production plant (Factory & Warehouse).	Highland Spring (UK)	Customer, Supply and Logistics Manager	27/11/2012	2 hour	
	-Finance Team - Factory and Warehouse Team				
CS 7 Decision on products distribution.	Highland Spring (UK)	Head of Supply Chains	4/11/2012	1 ½ hour	
	- Supply Chain Team - Sales Team - Finance Team	Customer, Supply and Logistics Manager	27/11/2012	2 hour	

CS 8 Decision on managing order request and processing.	Highland Spring (UK)	Demand Manager	4/11/2012	1 ½ hour	9. From your opinion, what are the factors that contribute to trust? 10. Are there certain kind of decisions that are more suited to use E-Collaboration Technologies and other are not? What are these and why?
	-Customer Service Team, - Planning team - Sales team	Customer, Supply and Logistics Manager	27/11/2012	2 hour	

In general, there are several available instruments that researchers can use to collect field data from case studies organizations. Yin (2003) identified that evidence for case studies may come from six sources each one is associated with some weaknesses and strengths. The six sources and the weaknesses and strengths will be shown in the Table 5.4:

Table 5.4 Six sources of evidence for case study research, Yin (2003)

Source of evidence	Strengths	Weaknesses
Documentation	<ul style="list-style-type: none"> ▪ Stable-can be reviewed repeatedly ▪ Unobtrusive-not created as a result of the case study ▪ Exact-contains exact names, references, and details of an event 	<ul style="list-style-type: none"> ▪ Retrievability- can be low ▪ Biased selectivity, if collection is incomplete ▪ Reporting bias-reflects bias of author ▪ Access-may be deliberately blocked
Archival Records	<ul style="list-style-type: none"> ▪ Same as above for documentation ▪ Precise and quantitative 	<ul style="list-style-type: none"> ▪ Same as above for documentation ▪ Accessibility due to privacy reason
Interviews	<ul style="list-style-type: none"> ▪ Targeted-focuses directly on case study topic ▪ Insightful-provides perceived causal inferences 	<ul style="list-style-type: none"> ▪ Bias due to poorly constructed questions ▪ Inaccuracies due to poor recall ▪ Reflexivity-interviewee gives what interviewer wants to hear
Direct Observations	<ul style="list-style-type: none"> ▪ Reality-covers events in real time ▪ Contextual-cover context of event 	<ul style="list-style-type: none"> ▪ Time consuming ▪ Selectivity-unless broad coverage

		<ul style="list-style-type: none"> ▪ Reflexivity-event may proceed differently because it is being observed ▪ Cost-hours needed by human observers
Participants observation	<ul style="list-style-type: none"> ▪ Same as above for direct observations ▪ Insightful into interpersonal behavior and motives 	<ul style="list-style-type: none"> ▪ Same as above for documentation ▪ Bias due to investigator's manipulation of events
Physical Artifacts	<ul style="list-style-type: none"> ▪ Insightful into cultural features ▪ Insightful into technical operations 	<ul style="list-style-type: none"> ▪ Selectivity ▪ Availability

While (Voss et al., 2002) identified that usually interviews are extensively used in collecting data in case study research, he identified triangulation as an underlying principle in collection of data in case study research; the accumulation of multiple entities as supporting sources of evidence to assure that the fact being collected are indeed correct (Meredith, 1989). In this research project, the main data collection methods used were interviews and documentation.

Interviews are one of the most important sources of case study information (Yin, 2003). It appears to be a guided conversations rather than structured quires. There are many ways in which an interview can be conducted and evidence gathered. Interviews can be un-structured, semi-structured or highly structured resembling a questionnaire (Voss et al, 2002). The effectiveness of case research is much dependent on the skills of the interviewer. Skilful interviewer must ask good questions, be a good listener, have a good understanding of issues being studied and avoid any preconceived notions from theory. In this research project, the researcher conducted several semi-structured interviews with key managers to discuss their collaborative relations with the other side of the dyad. The interviews, where possible, were digitally recorded.

Documentation takes many forms, letters, memoranda, agendas, administrative documents (proposals, progress reports, etc), formal studies and articles appearing in media. It should be noted that collecting documents requires high levels of trust between case company and the researcher to disclose confidential information. So understandably a number of companies were reluctant to give copies of their documentation.

By making a field visit to the case study site, the researcher had the opportunity for some direct observations. In some cases, some relevant behaviours or environmental conditions may serve as another source of evidence in case studies (Yin, 2003).

5.3.2 Data Analysis Methods

Miles and Huberman defined analysis as consisting of three concurrent flows of activity: data reduction, data display and conclusion drawing/verification. These processes of analysis were adopted in this research.

Data reduction is a form of analysis that sharpens sorts, focuses, discards, and organizes data in such a way that final conclusions can be drawn and verified. Qualitative data can be reduced and transformed in many ways: through selection, through summary or paraphrase, through being subsumed in a larger pattern, and so on.

The second major flow of analysis activity is **data display**. Generally, a display is an organized, compressed assembly of information that permits conclusion drawing and action. Miles and Huberman (1994) identified that better displays are a major avenue to valid qualitative analysis. Generating formats for displaying qualitative data fall into two major families: matrices, with defined rows and columns, and networks or maps, with a series of nodes with links between them. Generally, displays can be simple arrays, but might also be event listings, critical incident charts, networks, time ordered matrices, taxonomies, etc (Voss et al, 2002).

The third stream of analysis activity is **conclusion drawing or analysis**. Once an array or display has been constructed, the researcher should begin looking for explanations and causality (Voss et al, 2002). Analyzing data is the most difficult and the least codified part of qualitative studies. Several authors identified the importance of undertaking both within-case and cross-case data analysis for analyzing data in qualitative studies (Eisenhardt, 1989; Yin, 2003; Miles and Huberman, 1994; Voss et al, 2002).

In this study, data analysis processes were done in several steps. Firstly, after all the data had been collected, the researcher transcribed the audio manually without using any software and document it. This is to ensure output from the interview can be analyzed as a whole without discard any important data. Then the data collected from case study companies will be analyzed individually (within-case analysis), then collectively (cross-case analysis) and finally the findings from literature and case studies will be discussed together (enfolding literature).

5.3.2.1 Within-case Analysis

The main objective of within-case analysis is to make the investigator become familiar with every cases as a stand-alone entity and to allow unique patterns of each case to emerge before generalizing patterns across cases (Eisenhardt, 1989). In this research, the research questions, constructs and the developed framework drive the within-case analysis technique. The main aim behind the research questions in this research is to investigate the adoption of E-Collaboration Technologies whether it can assist or become the barrier in collaborative decision-making. Hence, during the data analysis, the researcher also aims to identify factors that contribute to inter-organizational trust in collaborative decision-making with the adoption of E-Collaboration Technologies.

The analysis starts with a narrative discussion to compile every sides of case point of view regarding the impact of E-Collaboration Technologies in making collaborative decision-making. The role of the narrative is to provide a description and explanation of what is happening during the process of making decision using E-Collaboration Technologies, what are the barriers and what are the factors that they should consider to develop trust within the process of making online or face-to-face decision. The narrative discussion is contrasted against previous literature to identify what supports / contradicts / extends previous studies as well as exploring new factors and how they affect decision-making process in collaborative enterprises.

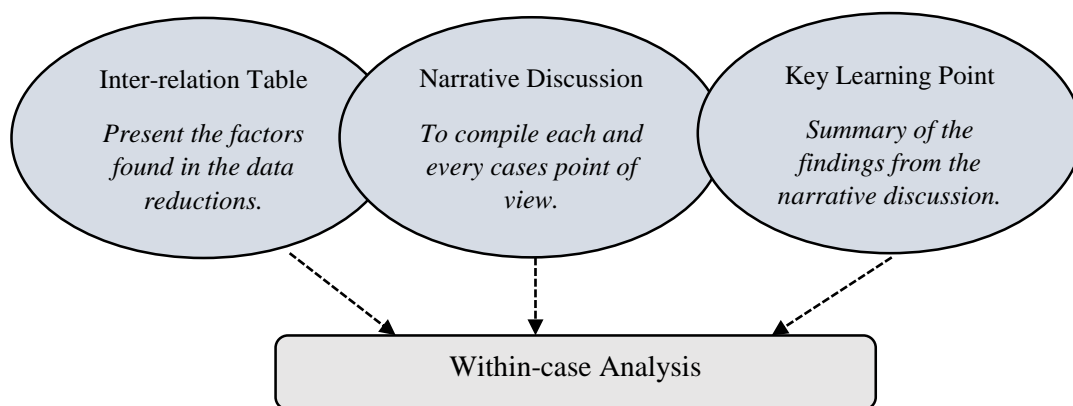


Figure 5.3 Different phases conduct in within-case analysis

5.3.2.2 Cross-case Analysis

The systematic search for cross-case patterns is a key step in case research (Voss et al, 2002). Cross-case analysis is about studying several individual cases with the aim of identifying patterns across the cases, hence drawing more generalizable conclusions about the phenomena under examination (Bryman and Burgess, 2002). Cross-case analysis forces the investigator to go beyond initial impressions and improves the likelihood of developing accurate and reliable theory (Eisenhardt, 1989). At a deeper level, the aim is to see processes and outcomes across many cases, to understand how they are qualified by local conditions, and thus to develop more sophisticated descriptions and more powerful explanations. Besides, cross-case analysis aims at deepening understanding and explanations, hence reassuring that the events and the processes in one well-described setting are not wholly idiosyncratic.

Eisenhardt (1989) and Miles and Huberman (1994) identify numerous techniques for cross-case analysis; the simplest and often most effective method is to construct a visual display of the data so that the researcher can draw valid conclusions (Voss et al, 2002). Having constructed an array, a simple but very effective analytical approach is to pick up a group or category and search within for group similarities or differences. A similar approach is to select pairs of cases and look for similarities and differences, including subtle ones.

Miles and Huberman (1994) identified two different strategies that are useful for cross-case analysis; case-oriented strategy and variable-oriented strategy. A case oriented

strategy advocates a replication strategy (either theoretical or literal replication) for the conceptual framework across the cases involved in the study, whereas, in a variable oriented strategy, researchers often look for themes that cut across cases. In general, they recommended the use of both case-oriented and variable-oriented approaches.

In this research, both strategies were used to identify themes and patterns across the examined cases. In the case-oriented analysis the conceptual framework was used to compare the findings across all the cases following Yin's (2003) argument that data analysis should rely on the theoretical propositions that led the case study in the first instance. The variable-oriented strategy, where the building blocks are the variables and their interrelations, aims to identify emergent themes around the different variables across the investigated cases. Outcome from the cross-case analysis are the pattern tables that present the findings to answer the research question two and three.

5.4 Validity

Evaluating research quality is intended to provide confidence to research findings. In any research project, it is particularly important to pay attention to reliability and validity of the research. Four tests have been commonly used to establish the quality of any empirical social research; construct validity, internal validity, external validity and reliability (Yin, 2003).

Voss et al (2002) provides a concise description for the four measures. They identified that construct validity refers to the extent to which the researcher established correct operational measures for the concepts being studied. Internal validity refers to the extent to which the researcher can establish a causal relationship. External validity is the measure that aims to realize the extent of generalizing a study's findings beyond the immediate case study. Reliability is the extent to which a study's operations can be repeated with the same results. In case study research as a form research, the development of case study designs needs to maximize these four conditions to inspire confidence in the research findings and produce rigorous results. Yin (2003) identified several tactics for dealing with these four tests when doing case studies. Table 5.5 lists the four tests and the recommended case study tactics as well as a cross reference to the phase of research when the tactic is to be used.

Table 5.5 Case study tactics for research quality tests, Yin (2003)

Test	Case Study Tactic	Phase of research in which tactic occurs
Construct validity	<ul style="list-style-type: none">• Use multiple sources of evidence• Establish chain of evidence• Have key informants review draft case study reports	Data collection Data collection composition
Internal validity	<ul style="list-style-type: none">• Do pattern matching• Do explanation building• Address rival explanations• Use logic models	Data analysis Data analysis Data analysis Data analysis
External validity	<ul style="list-style-type: none">• Use theory in single-case studies• Use replication logic in multiple-case studies.	Research design Research design
Reliability	<ul style="list-style-type: none">• Use case study protocol• Develop case study database	Data collection Data collection

5.5 Summary

The objective of this chapter is to discuss and identify the appropriate design for this case study research. To identify the appropriate design, the researcher had to make important decisions regarding case selection, data collection and data analysis. In the case selection, this research opted multiple-case strategy as it provides more compiling evidence and provides better opportunity for generalizing the research output. Furthermore, this chapter was also concerned with the data collection methods that has been used as data collection instruments within each of the cases. Interviews were identified as the main data collection tool for this research. This chapter also discussed the data analysis methods that will be used to analyze the collected data. In addition, cross case analysis has been carried on to build an explanation of what is going on across the cases.

Next chapter will discuss the within-case analysis and present it in a key learning point tables as a summary of narrative discussion in within-case analysis.