Strathclyde Institute for Operations Management

Department of Design, Manufacture and Engineering Management

Glasgow, UK

Collaborative Decision-making in Supply Chains: The Impact of e-Collaboration Technologies on Efficiency, Effectiveness and Inter-organizational Trust

By

Nora Azima Noordin

A thesis presented in fulfilment of the requirements for the degree of

Doctor of Philosophy

2014

COPYRIGHT STATEMENT

Signed:

Date:

ACKNOWLEDGEMENTS

First and foremost, I want to thank to Allah SWT because of His Blessing.

It gives me an immense debt of gratitude to express my sincere thanks to both of my supervisors, Professor Umit Bititci from Department of Design, Manufacture and Engineering Management and Dr. Robert van der Meer from Department of Management Science for their excellent guidance, constant encouragement, patience and care from day one I registered at the University of Strathclyde until my Ph.D viva day. I cannot express how much I really appreciate their help. I have been extremely lucky to have them as my supervisors who cared so much about my work.

I also would like to thanks to my Ph.D sponsorship; MARA and University of Kuala Lumpur, Malaysia. Thank you for giving me the opportunity to pursue Ph.D and working with them upon completion of my Ph.D. Thank you for the funding given for almost four years and special thanks to Prof. Mazliham, Prof. Azanam and Prof. Azizan for their helps and guidance throughout my research journey. I am really looking forward to work with University of Kuala Lumpur soon.

There are a number of people without whom this thesis is not written, and to whom I am greatly indebted. To my beloved parents in Malaysia; Noordin Ali and Romlah Mohd Isa and my parent-in-law; Sheikh Daud and Hamimah Osman. Thank you for your supports since forever. They have been a source of encouragement and inspiration to me throughout my life. Also, to all four of my siblings; Nora Aniza, Norzaimi Izham, Nora Alina and Nora Afida. Thank you for taking care of our parents while I'm in the UK.

I must express my gratitude to Sheikh Ezhazzaf, my one and only beloved husband, for his continued support and encouragement. He is always there during my ups and downs, he is a shoulder for me to cry on. Thank you for accompany me while I am writing my thesis until 4 am in the morning consistently. Thank you for understand me enough and not asking me to do house chores, even to cook your lunch when you know I'm busy with my thesis. I love you so much!

And finally, to all my research colleagues in DMEM who knows what it would to be as a Ph.D research student, everybody has their own stories, the journey may be the same, but the obstacles that we will find along the journey are what make us different. To Anjar Priyono, Peipei Wu and Faridah, we had a great time together since our first day knowing each other. Thank you for your guidance and knowledge sharing. I really appreciate our friendship, may it last forever.

Nora Azima Noordin

January 2014

University of Strathclyde, Glasgow

CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

The purpose of this research is to identify the impact of E-Collaboration Technologies on the efficiency and effectiveness of collaborative decision-making in two types of Supply Chains; Service Supply Chain and Manufacturing Supply Chain. It is also to determine whether or not E-Collaboration Technologies enable collaborative decision-making and to examine the impact on difference decision-making styles and task types. Besides that, this research also endeavours to identify the impact of E-Collaboration Technologies on trust development in the context of Supply Chains collaboration.

Earlier studies confirm that there are different decision-making styles adopted by managers in their decision-making process. This study explores every aspect of the decision-making styles and relates it to Supply Chains decisions activity. The current scenario which requires collaboration among different parties globally, the adoption of E-Collaboration Technologies able to assist the key decision-makers to collaborate together and to achieve the objectives. However, there are in certain conditions where E-Collaboration Technologies are not suitable to adopt because of several decisions' characteristic which will be discovered in this thesis.

The researcher adopted qualitative research design where case studies become the main research method. This study consists of eight case studies of collaborating projects in the Service Supply Chain and Manufacturing Supply Chain. Based from the construct on the impact of E-Collaboration Technologies on efficiency and effectiveness that earlier developed during the review of literature, the researcher conducted semi-structured interview with the key decision-makers and consequently further develop the framework that has been introduced as the conceptual framework.

The research findings prove that there are certain collaborative decision-making styles and decision task types that able to accept E-Collaboration Technologies as a medium of making decisions and certain are not due to the complex nature of the decisions. This research also differentiates the impact of E-Collaboration Technologies used in the Service Supply Chain (communication technology) and Manufacturing Supply Chain (online business process tools).

CHAPTER 1

INTRODUCTION

Most organizations strive to take advantage of new and constantly evolving technologies to enable them to make full use of available systems, processes, and people even across geographical and temporal boundaries. The improvements in capability and accessibility of electronic communication technologies have created the reality of using computer-mediated communication (CMC) technologies as a method between organizations to communicate and share information; in other words, face-to-face interactions are replaced.

This scenario also happens in supply chain area. Over the past decade a combination of global economic, technology and market environment has compelled companies to revise and reinvent their supply chain strategies. Globalization connects companies to collaborate thus as a result; it will provide full benefits to the customer demand effectively. Collaboration opens the opportunity to adopt electronic communication technology as a tool for exchange information and making fast decisions regardless geographical dispersed among the collaborated parties. Effective and efficient teams communicate, collaborate and perform even if these organizations are not co-located. Yet the use of electronic communication technology is common and will likely become more commonplace as organizations continue to update and use increasingly sophisticated technology.

Rapid changes in technology give impact to the style of managing supply chain processes. Collaborations improve supply chain processes by increasing the intensity and scope of co-operative behaviour between two or more independent decision-making units. Today, collaborative decision-making processes are supported by advanced ICT. It is argued that the value and importance of collaboration have changed, as we migrate from traditional supply chain management (SCM) approach to the e-SCM perspective (Williams et. al., 2002).

1.1 Scope of the Work

This research is an interdisciplinary research where it combines the area of supply chains (Service Supply Chain and Manufacturing Supply Chain), information communication technology (E-Collaboration Technology) and management research (decision-making and trust). The purpose of this research is to explore and determine whether or not E-Collaboration Technologies are enabling collaborative decision-making in the supply chain activities.

1.2 Thesis Structure

Each chapter of this thesis starts with an introduction that specifies the aim behind the chapter. At the end of the chapter, there is a summary of what was achieved in that chapter. Generally, the thesis is structured in seven chapters, as follows:

Chapter Two: Exploratory Literature Review

Presents an exploratory literature review to establish the gap in knowledge. This chapter also introduces the concept in E-Collaboration Technology and trust in organizations.

Chapter Three: Focused Literature Review

In-depth literature review on Supply Chain Collaboration and Collaborative decision-making are discussed in details. The conceptual framework driving this research is presented in this chapter and this chapter also is an attempt to answer the Research Question 1.

Chapter Four: Research Methodology

This chapter aims to review the methodology literature, the different research paradigms, the associated philosophical positions and the different research strategies. The chapter will take the reader step by step to justify the philosophical paradigm of this research. Finally, the chapter identifies and justifies the selection of case-study research as the appropriate strategy for this research.

Chapter 5: Research Design

This chapter aims at specified the underlying research design, including case selection, data collection and data analysis. In addition, methods to assess research quality in case-study research are explored.

Chapter 6: Empirical Findings (Within Case Analysis)

This chapter aims to present the analysed data collected from the case studies to show the narrative discussion of each case. The key learning point table is presented as a summarized of what has been identified in every case.

Chapter 7: Empirical Findings (Cross Case Analysis)

Presentation of the analysed data from comparing the findings of the different cases through which answers to the research questions 2 and 3 will be provided. The chapter will then present a discussion on the findings from the cross-case analysis.

Chapter 8: Discussion and Conclusion

This chapter will present a summary of the key conclusions that can be drawn from this research. It also provides a discussion on the limitations of the research. The implications this work has for theory and the recommended future work will be examined in details with some future recommendations being posed. The implications for practice are also considered in this chapter.

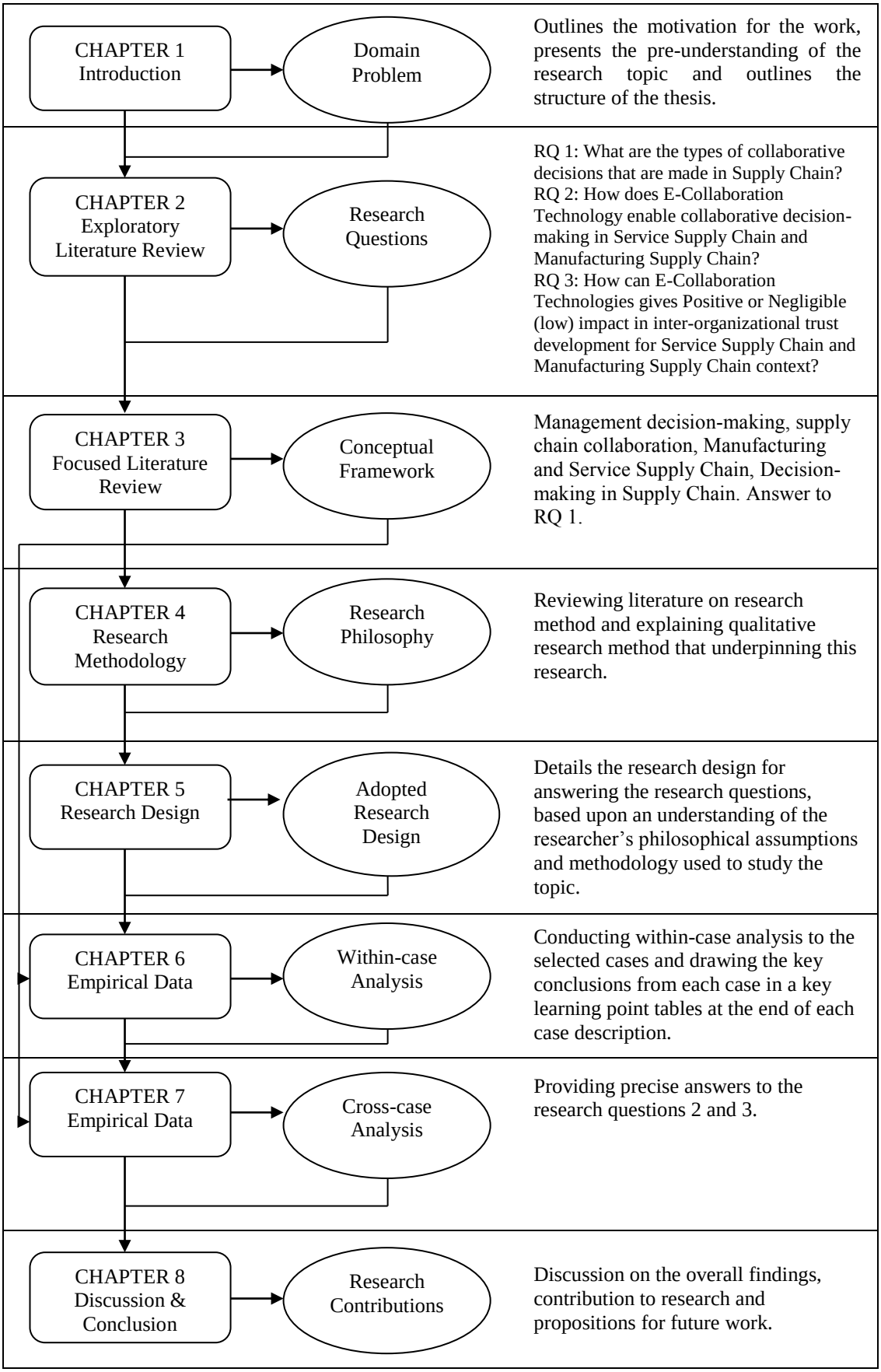


Figure 1.1 Structure of the thesis

1.3 Summary

This chapter provides an overview of the research study as well as the scope of the research. It also describes content in every chapter and flowchart of thesis structure.

Next chapter (Chapter 2) will be focusing on exploratory literature review and describe the research objective, gaps in knowledge and research questions.

CHAPTER 2

EXPLORATORY LITERATURE REVIEW

2.1 Literature Review Selections Process

The strategy adopted for conducting the exploratory review began with a general search of databases for "E-Collaboration Technologies" and its related terms, leading to source searches until fundamental of literature was found. The researcher decided to proceed with exploratory literature method instead of using a systematic literature review (Tranfield et al., 2003) which was considered but then rejected due to the exploratory nature of the study and the variation of research areas involved in this research as well as the lack of consensus in terminology that will be elaborated in the next sections. However, the researcher confidence that adopting an exploratory method for searching and selecting the appropriate literature is effective in inter-disciplinary research.

The process of acceptance and rejections the appropriate papers was made based on several criteria as below:

1. The literatures came from various sources such as articles and books, but the most referred literature was coming from high impact journal papers taken from high impact journal such as Journal of Operations Management, International Journal of Management Review, International Journal of Operations and Production Management, Decision Science, Supply Chain Management: An International Journal, International Journal of e-Collaboration and others.

2. The journal papers must include relevant keywords in each research area as below:

Table 2.1 Research Keywords

Research areas	Keywords
E-Collaboration Technologies	E-Collaboration Technology, E-Business, Computer Mediated Communication, Face-to-face VS Computer Mediated Communication.
Decision-making	Management decision-making, collaborative decision-making, decision-making in supply chains.
Supply Chain	Service supply chains, manufacturing supply chain, supply chain collaboration.
Trust	Interpersonal trust, inter-organizational trust, Trust between and within organizations, definitions of trust, trust in E-Collaboration Technology.

3. After getting the most accurate and suitable papers for further reading and reference, the researcher took several steps as in Table 2.2 below to include the literature review in the thesis.

Table 2.2 Steps taken in the literature review

Steps taken	Process
Explore the literature review	High level process on paper selections from high impact journal. It was based on the keywords from four aspects of research area. About 600-800 papers were carefully selected based on the journal title, keywords, author and year of publications.
Inclusion and exclusion	'The Bird Eye Scanning' or speed-reading technique was implemented in order to select the best and most accurate papers to be included in the research. The process includes reading the abstract, introduction and summary and then the conclusion part. The researcher also interested in the papers that implementing qualitative research methods, but some of quantitative papers were also considered. About 200-300 relevant papers were selected for inclusion in the research.
Selecting papers	Then, the process of selecting the most accurate papers related to the research areas begun. The selections were based on the keywords above, review of literatures, research methodology, results and findings. In conclusion, 222 papers were finally selected as the best papers to be included in the research. The massive number of papers selected were due to the diversity and interdisciplinary of the research components involved in this research.

2.2 Identify the Gap

Supply chain collaboration has been researched in various area, however little attention had been paid to capturing the role played by the Inter-organizational systems (IOS); which is in this research it is focusing on E-Collaboration Technologies used to facilitate supply chain collaboration (Zhang & Chao, 2012). Thus, a thorough understanding of the impact of E-Collaboration Technologies on decision-making activities in supply chain collaboration is extremely important. Another gap that had been identified as an unexplored in the literature is in term of adoption of IOS for communication and IOS use of intelligence to improve supply chain partners' joint knowledge creation and decision-making. There are less literature focus specifically on the roles of IOS to facilitate collaborative decision-making in supply chain activities.

Furthermore, considerable difficulties exist among supply chain partners due to mutual distrust during the collaboration process (Simatupang & Sridharan, 2005). Trust has become a central concept in explaining business behaviour in organizational contexts. In recent years, many studies have examined the conditions and variables that influence the creation of organizational trust (Bachmann & Inkpen, 2011). Collaborations between supply chain partners are not merely pure transactions, but it involves long term partnerships which require a lot of trust. Zhang & Chao (2012) mentioned that trust actually has many impacts on IOS enables supply chain collaboration. However, there is very little research that look at each and every aspect as mentioned above. Thus, this research intends to explore on the concept of organizational trust in relation to the adoption of E-Collaboration Technologies in supply chain decision-making.

As a basis of understanding the domain problem, it is necessary to review the existing literature in the area of E-Collaboration Technologies in order to identify the following:

- What is E-Collaboration Technologies in a general sense, for example the definitions, category and technology evolutions?
- What is the E-Collaboration Technologies in the perspective of supply chain management and how it relates to decision-making process?

2.3 E-Collaboration Technologies: What are they?

There is a large but subtle difference between collaboration and E-Collaboration. The difference being that the latter engages technology to facilitate and enhance the processes of collaboration. (Jones, 2012). In the context of business, collaboration is a process through which two or more firms work together to achieve some practical outcome. In doing so, they will generally share resources, joint decision-making and commit to a mutually shared goal (de Vreede et al., 2009).

E-Collaboration Technologies system plays vital roles in organizations. Media that support E-Collaboration Technologies enables modern business-to-business commerce, electronic commerce and supply chain management (Kock, 2005). E-Collaboration Technologies system facilitates the formation of strategic partnerships (Choe, 2008) and global integration (Heidecke & Back, 2009) to competitively carry-out complex task (de Vreede et al., 2009). Organizations that utilize E-Collaboration Technologies can save time, money and manpower (Ko, Olfman & Choi, 2009).

E-Collaboration Technologies in the context of supply chain is an amorphous meta-concept that has been interpreted in many different ways by both organizations and individuals. The academic definitions of 'e' of E-Collaboration Technologies mainly focus on B2B internet-based technologies, while practical definitions have wider scope referring to any electronic technologies (Wang, 2006). Table 2.3 represent the definitions of E-Collaboration Technologies in the context of supply chain.

Table 2.3 E-Collaboration Technologies definitions

Author	E-Collaboration Technologies Definition
McDonnell (2001)	Internet-based collaboration which integrates people and processes giving flexibility to supply and service chains.
IBM (2001)	Anything that allows people to collaborate - or work together - more easily using electronic tools.
Johnson and Whang (2002)	Business-to-business interactions facilitated by the Internet. These interactions go beyond simple buy/sell interactions and may be better described as relationships. These include such activities as information sharing and integration, decision sharing, process sharing and resource sharing.
Mayrhofer and Back (2003)	Computer mediated process of two or more (dislocated) people working together on a common purpose or goal, where the participants are committed and inter-dependent and work in a common context using shared resources, supported by (web-based) electronic tools.
(Kock & Nosek, 2005)	Collaboration among individuals engaged in a common task using electronic technologies.

Overall, it is demonstrated that E-Collaboration Technologies are a very broad and encompassing term in supply chain management. Up to date, there is no accurate definition of what it really implies. It has different interpretations under different contexts. Meanwhile, it seems that the intra-organization E-Collaboration Technologies are less difficult to implement with the wide adoption of Enterprise Resource Planning (ERP) systems, but little research has been done to clarify and investigate in depth how companies utilize information technologies to achieve supply chain effectiveness in the context of collaborative decision-making through collaboration across internal processes (Wang, 2006).

2.3.1 E-Collaboration Technologies Application Taxonomies

A first approach to providing a taxonomy of collaborative systems is to distinguish them by when and where the interaction takes time/place taxonomy, see Bafoutsou & Mentzas, (2002). In this context, two primary dimensions are identified as in Figure

2.1 In the horizontal dimension it orders the collaborative tools by the location of participants: they can be either at the same place (also referred to as co-located) or at different places (remote). Similarly the vertical dimension makes the distinction, whether the interaction happens at the same time (synchronous) or at different times (asynchronous). These dimensions provide four communication scenarios: synchronous-co-located, asynchronous-co-located, synchronous-remote and asynchronous-remote.

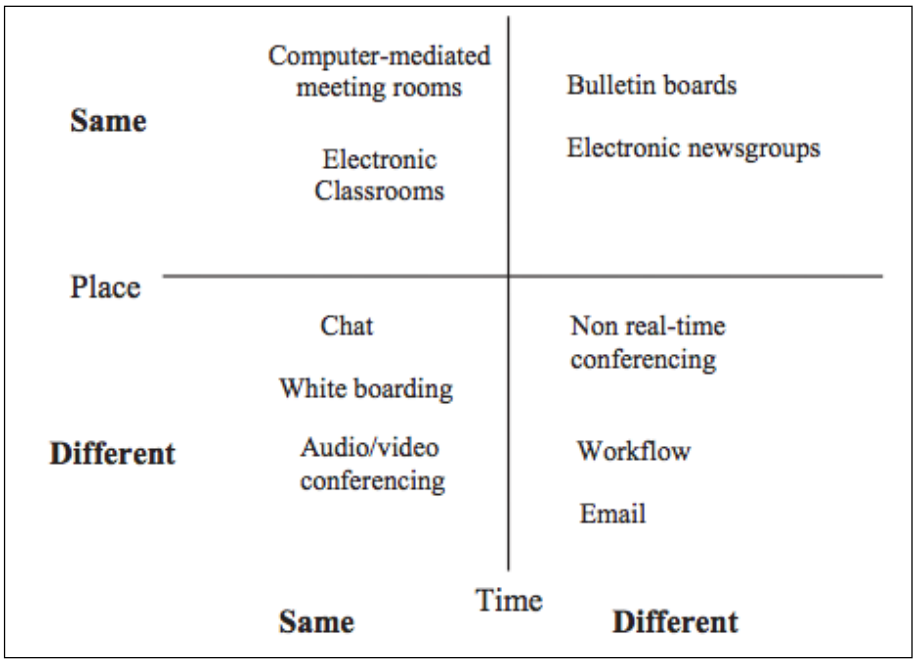


Figure 2.1 The time/space classification (Bafoutsou & Mentzas, 2002)

A large body of academic literature examines how communication can be made more efficient and effective, and conversely how the process of communication can be ruined and become dysfunctional (Berry, 2011). As technologies has evolved, time and distance barriers have evolved and organizations started to consider adopting electronic communication in their business process. Any types of communication, electronic or face-to-face, synchronous or asynchronous, is structurally, situational and culturally embedded, yet the move to computer mediated communication further challenges and complicates all of this factors (Berry, 2011). Table 2.4 illustrates some of the differences between face-to-face communication and computer mediated communication (CMC).

Table 2.4 Asynchronous VS Synchronous Communication

(Adapted from (Berry, 2006)

Asynchronous Discussion Compared to Synchronous Discussion	
Asynchronous Discussion (Online discussion)	**Synchronous Discussion (Face-to-face discussion)**
Discussion is from one person to another, or one to many, but also many to many.	Discussion is one to one, or one to many, but no many to many.
Multiple discussions are underway at the same time.	There is only a single discussion underway at a given time.
Everyone is able to talk simultaneously, so no one is ever blocked, and all participants can be active at the same time.	Only one person talks at any one time and everyone else is blocked, so participants are in listening mode most of the time.
Conversions lack hierarchy and tend to be more democratic.	Conversions are often top-down, with hierarchy visible and present.
There are few social and political or power cues, and no body language.	There are many social and political and power cues, with much body language.
The discussion operates 24/7, and participants usually have freedom of choice as to when they participate.	The discussion operates for a specific and limited time frame, at a specific place, and participants must be physically present to contribute.
The discussion is free of time and geographic space constraints.	The discussion is constrained by specific time and geographic limitations.
The discussion is archived, creating a permanent record of all discussion.	The discussion is not archived, so there is rarely an accurate record of all discussion.
Feedback can be slow.	Feedback can be instant.

2.3.2 Evolution of E-Collaboration Technologies System

From the history of technological innovation, E-Collaboration Technologies could have begun between the early 1970s and 1980s after email was discovered and widely used by researchers and computer scientists (Kock & Nosek, 2005). Email thereafter became an essential E-Collaboration Technologies before some other new

technologies took place and become known as group decision support systems (or GDSSs) in the 1980s. GDDS aimed at improving the efficiency of same room, same place group meetings through features such as anonymous and simultaneous idea generation and voting. Example of early GDDSs are GroupSystems, Teamfocus and MeetingWorks (Kock, 2005).

In the early 1990s, Internet has been widely used which essentially a worldwide network of computers is made up in many Local Area Networks (LANs), interacting through the same general communication protocol. The innovation of better technologies nowadays giving advantage for the development of E-Collaboration Technologies system where most of the systems are internet-based tools. Its enabling proprietary client software interacts with other clients either directly (peer-to-peer E-Collaboration Technologies tools) or through servers (client-server E-Collaboration Technologies tools).

Today, most of the daily life activities relates to the used of Internet technologies. People's communicating online, most of the job tasks has been done through web-based systems and E-Collaboration Technologies systems expanding it capabilities in various ways such as service, social, business, manufacturing and many more. In today's business environment, decision-makers often work in teams, and E-Collaboration Technologies are giving them a powerful tool to perform their duties in an efficient and effective manner from around the globe. E-Collaboration Technologies enable comprehensive distance collaboration for product development, manufacturing, and marketing. Another trend that has added to the popularity of E-Collaboration Technologies in recent years is the increased interest in the creation of virtual organizations, which are networks of independent companies, suppliers, customers, and manufacturers connected via information technologies so that they can share skills and costs and have access to each other's markets. Also virtual teams increasingly use E-Collaboration Technologies in order to implement complex organizational decisions in a timely manner (Bidgoli, 2012).

Electronic meeting systems and groupware are among the key technologies used for E-Collaboration Technologies. (Bidgoli, 2012) highlighted Electronic meeting systems that enable decision-makers in different locations to participate in a group decision-making process. There are various types of electronic meeting systems, which perform the following tasks:

- Real-time computer conferencing allows a group of people to interact via their workstations and share files, such as documents and images. This conference often includes an audio link but has no video capabilities.

- Video teleconferencing, the closest thing to a face-to-face meeting, requires special equipment and sometimes trained operators. TV cameras are used to transmit live pictures and sounds, and this is more effective than phone conferencing but also more expensive. The main drawback is that participants cannot share text and graphics.

- Desktop conferencing combines the advantages of video teleconferencing and real-time computer conferencing. Using these systems, participants can have multiple video windows open at one time. Participants also have interfaces to a conference installed on their workstations, so these systems are easier for employees to use.

Table 2.5 Tasks, technologies, contexts and theory over the eras (Bjørn Erik Munkvold, 2006)

	Tele-conferencing Era	**Group Support Era**	**Enterprise Era**	**Virtuality Era**	**Ubiquity Era**
Example Systems	Text, audio, video conferencing, email	Group support system, Electronic meeting system	Collaboration suite, Workflow management system, Knowledge management system	Distributed GSS, Web-based team/project room	Collabora-tion portal, Embedded collaboration tools
Technologies Focus	Communicati-on	Process	Information sharing and coordination	Tele-presence	Attention
Task Perspective	Communicati-on	Decision-making	Cross-organizational Knowledge	Modular, Rapid switching	Integrative
Contextual Issues	Technologies constraints	Team structure, Facilita -tion	Organization structure, Control, Rewards	Culture, Diversity, Norms, Leadership	Engagement
Theoretical Advances	Social presence, Media richness, Social influence, Critical mass	Process losses and gains, Task-technologies fit, AST, TIP, Channel expansion theory	Technological frames, Benefit asymmetry, Situated change, Technological drift, Knowledge management	Swift trust, AST, Social information processing, Duality/ discontinuity	*Recent technologies?*

Table 2.5 summarizes the eras and issues that revolves around the field as discussed in a publication by Erik Munkvold (2006). The table also shows an 'ubiquity' era that was defined as the current and near future era.

2.3.3 Early research in computer conferencing: Tele-conferencing Era

Developments in teleconferencing systems and services opened up new and exciting possibilities for human communication around 1960s and 70s. Egido, (1990) defined it as the use of electronic telecommunications to enable people to meet in spite of physical separation. The teleconferencing comprised a range of different media,

including videoconferencing, computer conferencing and audio conferencing (Bjørn Erik Munkvold, 2006).

The term Computer Mediated Communication (CMC) gradually became the unifying label for research related to teleconferencing, which also included e-mail as the most common form of electronic interaction in organizations. Rice (1992) discussed propositional reviews and models in CMC research, thus debunking the myth that CMC lacked a theoretical foundation. Three theoretical models have been particularly influential in this research: social presence theory, media richness theory, and the social influence model of media use.

Social presence theory (Short et al., 1976; Williams, 1977) conceptualizes communication media according to their ability to convey social presence, defined as the degree to which the medium facilitates awareness of the other person and interpersonal relationships during interaction (Fulk, Schmitz, and Steinfield, 1990). According to this perspective, face-to-face communication has the greatest social presence, followed by videoconferencing, audio conferencing, and ending with text only. Efficient communication requires matching the social presence level with the level of interpersonal involvement required for the task. The model was tested through several laboratory experiments with different telecommunications technologies and using cooperative vs. conflicting tasks. The experiments provided moderate support for the model (Short et al., 1976; Williams, 1977).

An alternative contingency-based theory is media richness theory, or MRT (Daft and Lengel, 1986), which classifies media according to their capacity to process rich information. Information richness is defined as the ability of information to change understanding within a time interval. The resulting continuum of communication media follows the same ordering as for social presence theory, with face-to-face as the richest medium. Rich media reduce equivocality, and should thus be selected for ambiguous tasks, while media of low richness (lean media) are effective for processing well-understood messages and standard data. Media richness theory has been widely tested, but there is limited support for the theory with more modern technologies (Markus, 1994; Dennis and Valacich, 1999). For example, in organizations, e-mail has been found to be used more intensively for conveying richer information than would

be predicted by the theory (Lee, 1994; Markus, 1994). In addition, channel expansion theory has shown how media perceptions are affected by and change over time as a function of knowledge of the task, the communication partner, the technologies itself, and the organizational context (Carlson and Zmud, 1999), thus calling into question MRT's fundamental precept that media characteristics are fixed.

Kiesler & Sproull (1991) provided a comprehensive summary of much of the CMC related research, focusing both on efficiency effects and social system effects. They discussed how various communication technologies such as e-mail, electronic bulletin boards, and teleconferencing systems might affect communication at individual, group, and organizational levels. The need for new social protocols and etiquette related to the use of electronic communication media was acknowledged early. Today, this issue seems more current than ever, as evidenced by the increasing problems of information overload and e-mail misuse. The characterization of technologies and their fit to tasks was through the lens of media and communication characteristics. Media richness and related theories provided a way of thinking about communication technologies that focused attention on technical-level aspects of systems and the extent to which each aspect hindered or promoted communication (Bjørn Erik Munkvold, 2006).

The teleconferencing era provided the essential foundation to move into the next phase of collaboration technologies, although some of the early pioneers took a while to be recognized by those "discovering" collaboration systems for the first time. Theories discussed above were just a starting point for the communication component of the upcoming group support era, thus brought to the forefront the decision support paradigm and broadening the scope of research related to collaboration.

2.3.4 Face-to-Face Teams and Group Support Systems: Group Support Era

The group support era was characterized by the growth of studies of collaboration technologies for supporting face-to-face teams. Although there was no shortage of typologies and discussion of the concept of "anytime, anywhere" support, clearly the greatest attention was given to same-time, same-place groups (Bjørn Erik Munkvold,

2006). Interestingly, the initial emphasis in this era is on decision-making, followed by a gradual shift to a broader support of different types of tasks. This shift is reflected in the move away from the GDSS acronym (group decision support system), to simply GSS (group support system). A GSS can be defined as a combination of communication, process structuring, and information processing technologies to support decision making and other functions of groups (Zigurs and Buckland, 1998).

Watson, Bostrom, and Kinney, (1992) mentioned in their publication that several universities had interdisciplinary teams conducting research during the group support era in the experimental and field settings. Nunamaker et al. (1991) summarized the early system development and foundational research, who describe the development of tools for electronic meeting systems (EMS), summarize the extant research, and describe the input-process-output approach that provided the framework for the research.

General conclusions from the group support era are that the use of a GSS can result in significant efficiency gains, enhanced participation, and increased buy-in to group decisions. Key success factors are a structured process, the right training, and the right people as facilitators and as group members. Idea generation tasks may benefit the most from group support, and task structure in decision-making tasks may be what makes the difference rather than the computer support per se (Hollingshead and McGrath, 1995). As for theory, a contingency perspective dominated, based typically on a classic input-process-output approach. Input factors that combined to affect group process were typically organized in terms of the major categories of technologies, task, group/individual characteristics, and environment. Output was viewed in terms of effectiveness, efficiency, and member satisfaction, and was measured almost exclusively by member perceptions. Theory can be characterized as being in early developmental stages. Notable theoretical development included the theory of process losses and gains (Nunamaker et al., 1991), adaptive structuration theory (e.g., DeSanctis and Poole, 1994), and time-interaction-performance theory (McGrath, 1991).

2.3.5 Organizational Applications of Collaboration Technologies: Enterprise Era

During the 1980s, different collaboration technologies for organization wide use moved out from research labs for pilot testing and field trials in organizations. Several of these systems were in conflict with local, situated work practices which exposed a gap between designers' attempts to implement work structure in the technologies and users' actual needs for work support (Bjørn Erik Munkvold, 2006).

Some of the potential barrier to adoption of organization wide systems is that their benefit may not be perceived equally among the different stakeholders. While some users see immediate gains, others may actually perceive the use of such technologies only as extra work, for example, in recording and maintaining information. This phenomenon was illustrated by the adoption of automated meeting scheduling, where the immediate beneficiaries were those calling the meetings (manager or secretary), rather than the other group members who were required to maintain their electronic calendars. Later studies have confirmed how this disparity in work and benefit (Grudin, 1989, 1994b) can represent a major barrier in the adoption of collaboration technologies, both at the level of individual adopters and organizational units (Bowers, 1994; Munkvold, 2003; Rogers, 1994). Lack of integration among different tools was another important barrier for effective use. Organizational factors identified as important were champions, creating realistic expectations, providing adequate training and evolutionary support, and a need for process redesign.

In general, the research on enterprise-wide collaboration technologies can be characterized as rather diverse and heterogeneous, with few unifying theoretical frameworks or models. Examples of theoretical perspectives that have been applied include diffusion of innovation theory, socio- technical systems theory, social-cognitive perspectives, and structuration theory (Bjørn Erik Munkvold, 2006). Several broad frameworks have been developed, some with a focus on typologies and others on implementation.

Overall, from the perspective of the typology of collaboration technologies, organization wide systems bring into the picture the information sharing and coordination functions. In general, the research in organization-wide systems has not been very explicit about the nature of task and fit, at least not in relation to any established typology. That may be partly because the studies are typically field-based rather than experimental. But it may also be that fit in an organizational context needs to focus more on organizational level phenomena, for example, culture, structure, or reward systems (Bjørn Erik Munkvold, 2006).

2.3.6 Virtual Teams and Global Collaboration: Virtuality Era

Growing capabilities of collaborative technologies made the virtuality era possible, even though interest in distributed groups goes back all the way to the teleconferencing era. The late 1990s and early 2000s saw an upsurge in studies of virtual teams. Researchers began in university settings, with students from all over the world engaged in projects to learn about virtual team processes and technologies (Bjørn Erik Munkvold, 2006).

These quasi-experimental, quasi-field studies tended to enforce communication through technologies only, viewing face-to-face communication as a "contamination" of the virtual nature of a team. But increasing field work showed that most virtual teams also include occasional periods of face-to-face work, whether to initiate strangers or provide crucial "touchpoints" for sustaining team effectiveness (Maznevski and Chudoba, 2000; Dubé and Paré, 2004). The field studies have addressed a wide range of important issues, including technologies appropriation and adaptation (Maznevski and Chudoba, 2000; Sarker and Sahay, 2003), best practices in global virtual teams (Lurey and Raisinghani, 2001; Qureshi and Zigurs, 2001); and building of trust (Tucker and Pantelli, 2003).

The research from the virtuality era reveals a host of difficulties that virtual teams experience, including inefficient information exchange, confusing and lengthy discussion and interaction, unevenly distributed information, misinterpretation of silence, misattribution of team member action, coordination difficulty, cultural

barriers, lack of norm development, weak or problematic relational links, and obstacles to trust (Powell et al., 2004). Interestingly, while the research from the group support era started with an enthusiasm about how technologies could change group interaction from a positive frame, the virtually era seems to be more focused on obstacles (Bjørn Erik Munkvold, 2006). There were study after study about coordination, communication, and information exchange difficulties, and little in the way of testing of interventions that might overcome these difficulties. Creative thinking about such interventions is clearly needed.

A second major conclusion from the research in this era is that context is increasingly important, even fundamental. The substitution of "space" for "place" means that the usual physical signals of context are entirely missing, which leads to such problems as misattribution and difficulty with developing common norms (Bjørn Erik Munkvold, 2006). For example, virtual teams are surprisingly quick to conclude that distant members lack motivation but painfully slow to reconsider their attitudes even in the face of evidence to the contrary (Cramton, 2001). Without context cues to create a "sense of place" in cyberspace, virtual teams struggle and often fail. Technologies and well-developed process interventions can provide a powerful combination, but the right combinations have yet to be tested.

The collaboration technologies of the virtuality era runs the entire gamut of the functions from the typology. Indeed, the ideal for this era would be the integrated suites that offer full collaboration support across all functional categories. As virtual teams and organizations become more dispersed on a greater number of dimensions, their reliance on collaboration technologies for supporting a variety of functions becomes greater. But even more fundamental is their need to have the technologies create a shared space. These issues create unique opportunities for creative research (Bjørn Erik Munkvold, 2006).

2.4 E-Collaboration Technologies in Supply Chain Management

Saeed et al. (2011) proposed that Inter-organizational Systems (IOS) act as facilitators of integration and development of unique processes across the supply chains. By adopting various inter-organizational information technology applications, firms have gained significant benefits to collaborate with their suppliers (Wang & Wei, 2007).
The use of IOS in facilitating common operations between supply chain partners and relationship specific customization of information technology applications to promote strategic information flows are other interesting configurations proposed in the literature (Wang & Wei, 2007; Klein et al., 2007).

The adoption of IOS at strategic integration is defined as the extent to which members of the supply chain have developed joint knowledge sharing routines that facilitate use of innovative practices, sharing of new ideas, and working together in identifying and implementing improvement initiatives. Collaborative relationships exhibit knowledge sharing processes and promote leveraging of complementary resources (Modi & Mabert, 2007). Interaction involves actively sharing new ideas, jointly developing products, and working together toward identifying improvement initiatives.
The implementation of IOS at operational integration captures the extent to which supply chain members link decisions at different stages of the supply chain by routinely coordinating various operational processes and activities through information sharing. Wang &Wei (2007) argue that the degree to which operational decisions are integrated between two economic entities is an important dimension of relational governance structure.

While in financial integration, the adoption of IOS is defined as the extent to which supply chain partners jointly invest in projects of mutual interest. The sharing of assets and technology is a critical aspect of close coupling among supply chain partners. Further, joint investments from supply chain members show a willingness to share risks, and can result in resource efficiencies and process improvements (Lockstrom et al., 2010)

Internet and E-Collaboration Technologies applications have significantly influenced to the operation of Supply Chain Management (SCM) and increasingly separate the flow of information from the flow of physical goods. Hence, it transformed the traditional supply chain into more advanced which called 'E-Supply Chain' which by definition means the supply chain mediated by E-Business Technologies (Wang, 2006).

McLaren, Head, & Yuan, (2002) clarified E-Collaboration Technologies systems into three major types which are:

1. Message-based system
2. Electronic procurement hubs, portals or marketplaces
3. Shared collaborative systems (mainly one-to-one inter-organizational information systems).

Wang (2006) has putting those systems into classification as in Figure 2.2 and it provides a first cut approximation of which situations each system is most appropriate for.

Figure 2.3 demonstrates the development of evolution path of E-Collaboration Technologies from the synthesis of the literature by Wang (2006). Each stage is represented by the most typical supply chain software system at that time. In a nutshell, E-Collaboration Technologies evolves from intra- to inter-organizational collaboration, from vertical to horizontal collaboration and from operational to strategic level collaboration. With the proliferation of tools, systems and platform, organizations can now collaborate in a more flexible and portable way with different partners, comparing with traditional supply chain.

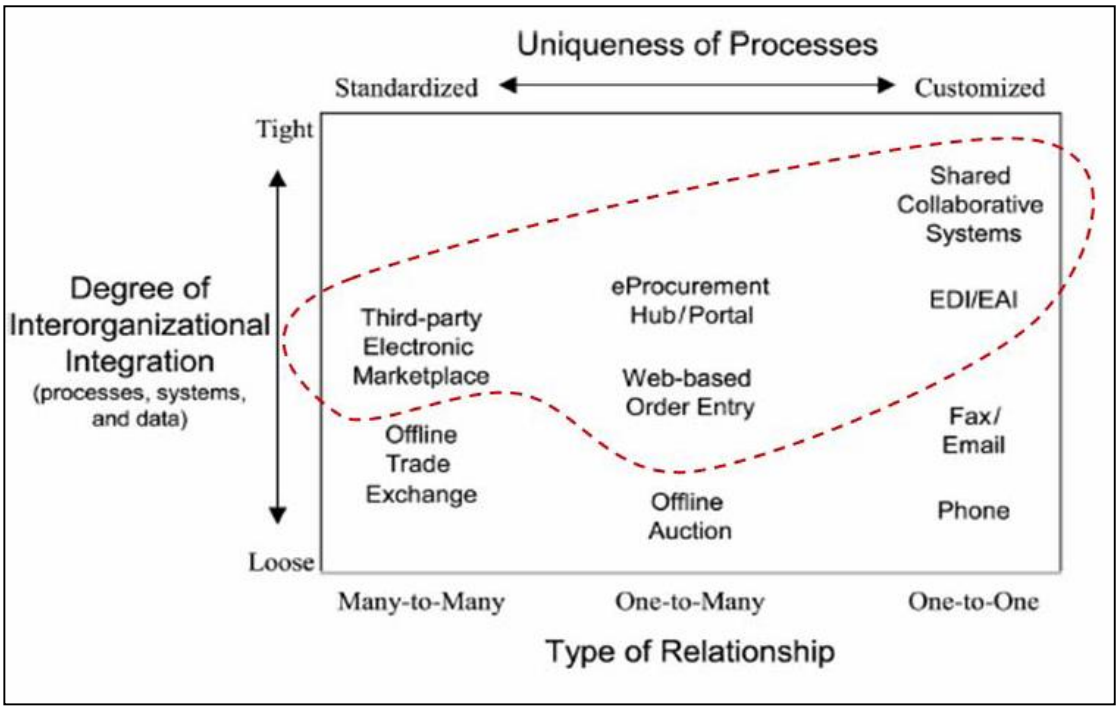


Figure 2.2 Inter-organizational systems for supply chain collaboration (McLaren et al., 2002)

As can be observed in Figure 2.3, recent web technologies has now triggered two emergent models: e-marketplace (6) and e-network (7). E-marketplace has been widely adopted in some industries such as automotive and electronics and well discussed in literature. E-network model is still at its infancy stage but has shown the great potential to satisfy the dual challenges in supply chain operation which are 'speed and flexibility' and 'low-cost and efficiency'.

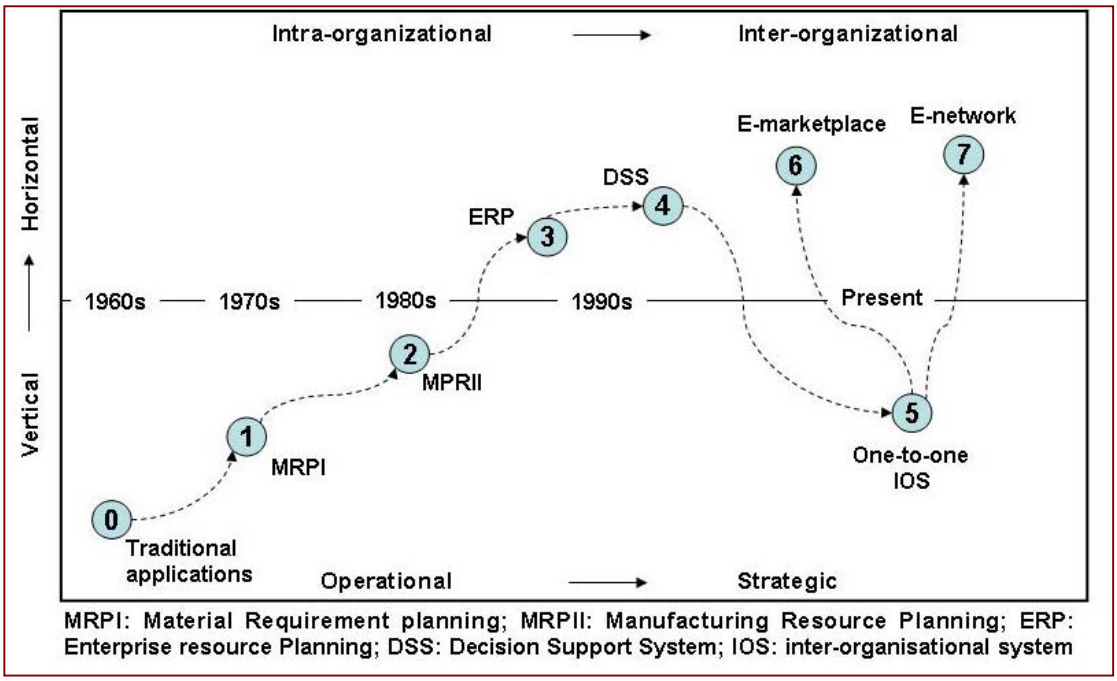


Figure 2.3 Evolution of E-Collaboration Technologies (Wang, 2006)

Few empirical studies have looked at the impact of fostering supply chain collaboration by means of electronic tools, though IOSs provides plentiful evidence of the benefits of electronic integrations. People in organizations need to be an effective communicators, using the computer mediated communication tools across distance and time zones, coping with the different norms and cultures of various departments, organizations or even nations (Berry, 2011).

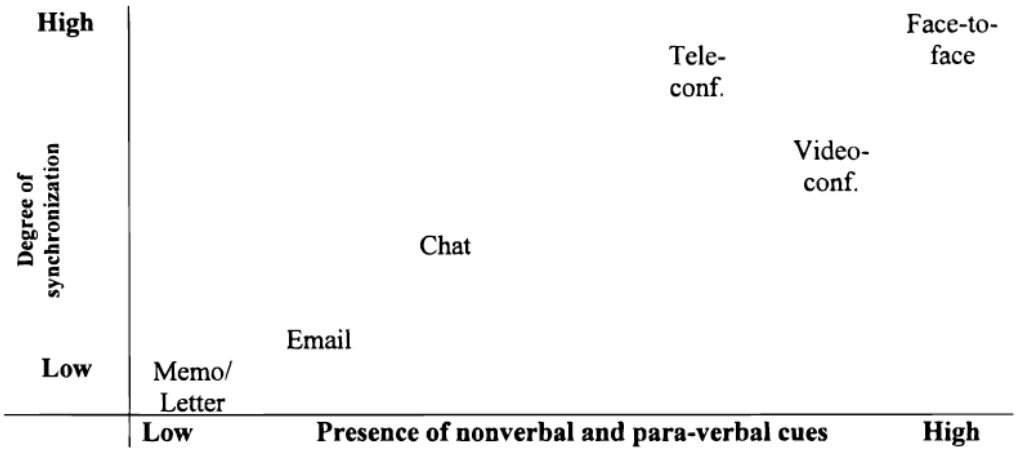


Figure 2.4 Placement of six communications media according to degree of synchronization (simultaneity) of communication and degree of nonverbal and para-verbal cues present (Baltes et. al, 2002)

Figure 2.4 as discussed by Baltes et al., (2002) shows a variety of communications media, suggesting that, for example a text-based synchronous media (i.e., "chat") will be less effective than face-to-face communication because chat is lower than face-to-face communication on both of the dimensions. This research is looking at this aspect as well; on the impact of efficiency and effectiveness of using E-Collaboration Technologies to the collaborative decision-making in supply chain. However, the researcher agreed with (Baltes et al., 2002) that there are many inconsistencies in the findings across studies. These was resulted from the various types of tasks used (e.g., intellective and idea generation), the samples examined (e.g., students and managers), the time allocated to complete the tasks, the types of communication medium (synchronous versus asynchronous) and the degree of anonymity.

As mentioned in (Sanders, 2007), the internet and web-based technologies have significantly improved collaboration and integration among supply chain partners permitting strong customer and supplier integration for supply chain activities (Feeny, 2001). The emergence of the Internet may have had the greatest impact on information exchange between buyers and sellers to date (Rabinovich et al., 2003). Accessing real-time demand information and achieving inventory visibility was virtually impossible prior to the Internet and relied on composites made from information accessed via telephones, faxes and EDI. The advance function of Internet has now surpassed technologies such as EDI in its information sharing capabilities and cost (Chopra et al., 2001).

As the organizations become more cost conscious, teams are more geographically dispersed and the rapid growth of Internet nowadays, more organizations will use E-Collaboration Technologies to achieve their productivity goals. Simple audio and video conferencing platforms have evolved into sophisticated virtual decision-making environments that are amazingly close to a real life face-to-face meeting. Cost saving, improved productivity, convenience, and enhanced capabilities offered by these decision-making tools have made them a household name in modern corporations (Bidgoli, 2012).

2.5 Computer Mediated Communication VS Face-to-Face Communication in Decision-making

Changes in the way organizations are structured and advances in communication technologies are two factors that have altered the conditions under which group decisions are made. Decisions are increasingly made by teams that have a hierarchical structure and whose members have different areas of expertise. In addition, many decisions are no longer made via strictly face-to-face interaction (Hedlund, Ilgen, & Hollenbeck, 1998). Technological advances have created new modes of communication by which decisions can be made. Electronic mail and computer conferencing, for example, are increasingly prevalent in organizations.

Research comparing traditional Face-to-Face (FtF) and computed mediated communication (CMC) group decision-making has explored a number of factors on which these media differ including volume or frequency of communication, information exchange, message content, distribution of communication across team members, time needed to make decisions and the decision quality (Hedlund et al., 1998). Advances in computing and telecommunications technologies are changing how people can meet and make group decisions. Technological changes help people cross physical, social, and psychological boundaries, and have secondary effects on group behavior and decision-making (Kiesler & Sproull, 1992).

People rely on multiple modes of communication in face-to-face conversation, such as para-verbal (tone of voice, inflection, voice volume) and nonverbal (eye movement, facial expression, hand gestures, and other body language) cues. These cues help regulate the flow of conversation, facilitate turn taking, provide feedback, and convey subtle meanings (Warkentin, Sayeed, & Hightower, 1997). As a result, face-to-face conversation is a remarkably orderly process. In normal face-to-face conversation, there are few interruptions or long pauses and the distribution of participation is consistent, though skewed toward higher status members (McGrath, 1990). CMC preclude these secondary communication modes, thus altering the orderliness and effectiveness of information exchange (Hightower, Sayeed, Warkentin, & McHaney, 1997). Such communication modalities are constrained to a varying extent depending

on the characteristics of the technological system. For example, electronic mail prevents both para-verbal and nonverbal cues, telephone conference calls allow the use of most para-verbal cues (but not nonverbal ones), while videoconferencing enables extensive use of both para-verbal and nonverbal cues.

Virtual teams are not able to duplicate the normal "give and take" of face-to-face discussion. For example, comments of group members using a synchronous computer mediated communication sometimes appear to be out of context, or the conversation may appear to lack focus because multiple group members are "talking" at once. This is exacerbated by the inefficiency inherent in the use of a keyboard and the fact that people type and read at different rates (Siegal et al., 1986). Group members who type slowly or edit more thoroughly may find their comments are no longer relevant when they are ready to transmit them. Moreover, because everyone can transmit their comments simultaneously, group members may be required to process a large number of comments in a short period of time. For asynchronous CMC, considerable delays typically occur between the time a message is sent and the time a reply is received. This may make it difficult to maintain a train of thought or a discussion theme (Warkentin et al., 1997).

When comparing CMC and FtF decision making, (Straus and McGrath, 1994) found differences between idea generation, intellective and judgment tasks. For idea-generation tasks, the outcome of interest is the number of unique ideas produced. On judgment tasks, the goal is consensus. Intellective tasks require the selection of a correct solution from among several alternatives. Straus and McGrath found that FtF groups were more productive than CMC groups on all three tasks, but the quality of the group's outcome was only better on the judgment task. Hedlund et al., 1998 suggested that judgment tasks required greater coordination, and coordinating was easier FtF.

To summarize, based from the literature, CMC groups exchange less information than FtF groups, but may produce more independent opinions. For tasks in which information exchange is critical (e.g., intellective tasks), the lower frequency of communications may inhibit effective decision-making. When the objective is to

arrive at a consensus judgment, CMC interaction may be more time consuming, but may help overcome some limitations of group decision-making, such as groupthink and polarization. There are conflicting findings regarding the status equalization effect in CMC group decision-making. More equal participation among members of CMC groups may be attributable to an across-the-board reduction in the amount of communication rather than a more even distribution of contributions. The persistence or attenuation of status effects in CMC interaction may depend on the awareness or expectations that such differences exist, rather than simply on features of the communication technologies. There is evidence that CMC groups take longer to reach consensus and exhibit more choice shift, but findings regarding decision quality are mixed. In some studies, FtF groups made better decisions, while in others no differences were found. These mixed findings may be attributable to differences in the relative importance of information exchange to decision quality. When the decision outcome depends heavily on information exchange, FtF groups have an advantage over CMC groups. But when other factors contribute to decision quality, CMC groups may be able to compensate for less information exchange (Hedlund et al., 1998).

2.6 The Role of Inter-Organizational Trust

Different concepts of trust have been provided by various studies. Basically, trust relations involve participation of at least two parties: the trustor, the party who places him or herself in a vulnerable situation under uncertainty; and the trustee, the party on whom the trust is placed, who has the opportunity to take advantage of the trustor's vulnerability (Laeequddin et al., 2009). Most common used definition of trust is as suggested by some researchers such as by Mayer et al. (1995). He defined trust as *"the willingness of a party based on the expectations that the other party will perform a particular action important to the trustor, irrespective of the ability to monitor or control the party"*. Kim et al. (2009) defined trust as a complex and multifaceted construct.

Issues associated with organizational trust have generated a great deal of broad scholarly interest in the field, as evidenced by the dozens of articles and special issues of the leading journals that have been devoted to the theme of trust. Yet, although there

exists a significant amount of literature on trust in an organizational context—as well as research in related areas such as alliances, social networks, and interpersonal trust—scholarly work specifically dealing with inter-organizational trust is a more limited area of research (Harris and Zaheer, 2006).

The researcher begins the discussion with a definition of trust in the context of inter-organizational. A commonly used definition of inter-organizational trust is *"the extent to which members of one organization hold a collective trust orientation toward another organization"* (Zaheer, A. McEvily, 1998). Relatedly, Currall and Inkpen (2002) draw attention to the socially constructed shared history within an organization toward another organization that constitutes a collective orientation. It is actually an important point to understand that inter-organizational trust is different with an individual trusting another individual; that is inter-personal trust.

A more organizationally oriented view is that trust is reciprocal or relational in nature (Hardin, 1991; Zaheer & Venkatraman, 1995). The term relational as it applies to trust has at least two implications: relational as social, and relational as dyadic. First, relational-as-social trust, in contrast to "calculative" trust or trust as quasirational choice, implies the inclusion of relational elements, or possessing a social orientation. MacNeil (1980) draws attention to relational contracting as a contrast to more explicit classical and neoclassical contracting. Relational contracting includes social elements such as norms and expectations as well as encompassing long-time horizons. Relational-as-dyadic trust suggests trust relative to an identified other and favors a dynamic and reciprocal rather than dispositional view of trust. In this way, a relational view of inter-organizational trust implies that a specific organization is the object of trust (Zaheer et al., 1998). Yet this does not preclude organizations from possessing or acquiring reputations for being trustworthy; to that extent, inter-organizational trust is not exclusively dyadic or relational but can be network based as well. Reputations may be more easily spread when the firm is embedded in a dense network of ties (Harris and Zaheer, 2006).

Some studies emphasizing the role of the past in the creation of trust show that the history of previous interaction between the organizations including familiarity as well

as relationship history leads to increased trust (Gulati, 1995), and some research goes so far as to use repeated ties as a proxy for inter-organizational trust (Gulati & Singh, 1998). However, other research (Lui & Ngo, 2004; Young-Ybarra & Wiersema, 1999) has found that the length of time the partner organizations have been together or even the mere presence of prior relations between two organizations is unrelated to trust. Although previous history clearly does not equate exactly to prospects for extended future collaboration, the question of how past ties and history serve as a signal of the "shadow of the future," and the associated trust or cooperation emanating from it, appears to be an unresolved issue. A way to reconcile the divergent sociological and economic perspectives is to look to the past history of the relationship as well as casting an eye toward prospects for future cooperation.

2.6.1 Role of Inter-Personal Trust

There is a wealth of research in the area of inter-personal trust in organizational contexts (Becerra & Gupta, 2003; Dirks & Ferrin, 2001; Kramer, 1999; Malhotra & Murnighan, 2002). Uncovering the precise relationship between inter-organizational and inter- personal trust is an important line of inquiry because, although the two forms of trust are shown to be related phenomena (Zaheer et al., 1998), they are clearly not the same thing. Studies show significant differences between inter-personal trust and inter-organizational trust in predicting outcomes (Hagen & Simons, 2003).

Nevertheless, interpersonal trust appears to be important in the development of inter-organizational trust (Zaheer et al., 1998). In other empirical studies, the influence of interpersonal trust on inter-organizational trust is not directly analyzed but rather has implied significance. In studies of inter-organizational trust within the context of small entrepreneurial firms, for example, inter-firm trust appears to be tightly linked to trust between individuals in those organizations (Howorth, Westhead, & Wright, 2004; Larson, 1992; Sapienza & Korsgaard, 1996). Even in the context of relations between larger organizations, stability of personnel appears to be an important factor in the development of inter-organizational trust (Dyer & Chu, 2000), suggesting the importance of trust between boundary-spanners (Currall & Judge, 1995). This idea is reinforced by research showing that interpersonal trust between boundary-spanners

decreases the likelihood of interfirm relationship dissolution (Seabright, Levinthal, & Fichman, 1992). John (1984) finds that boundary-spanner attitudes have a profound effect on norms of interfirm opportunism or cooperation, suggesting the importance of interpersonal trust; indeed, a multiplicity of interpersonal factors have been shown to heighten inter-organizational trust (Moorman, Deshpande, & Zaltman, 1993).

In addition, there are performance implications for the relationship between interpersonal and inter-organizational trust. For example, Jap and Anderson (2003) find that interpersonal trust between boundary-spanners has a positive effect on organizational performance measures, but this effect diminishes as ex post opportunism rises. Some effects of inter-personal trust are less clear, such as the inconclusive link between inter-personal trust and decreased organizational conflict (Zaheer et al., 1998). It does appear, however, that interpersonal trust at different levels of the organization has different effects; interpersonal trust among executives is a key factor in alliance formation and issue resolution, whereas inter-personal trust among midlevel managers has a greater impact on day-to-day efficiency of alliance operations (Zaheer, Lofstrom, & George, 2002). This outcome give significance impact towards collaborative decision-making among managers where the inter-personal and inter-organizational are two important attributes that need to be considered. Several studies attempt to gain more fine-grained insight into the nature of the tie between interpersonal and inter-organizational trust. Lui and Ngo (2004) discover a strong empirical distinction between two different dimensions of trust; goodwill trust and competence-based trust, each with different outcomes; finding that goodwill trust arises from inter-personal trust, whereas competence trust may derive from more general reputation effects.

In addition, although most of these studies examine the role of inter-personal trust in creating inter-organizational trust, research has also found support for inter-organizational trust's mediating influence on the relationship between organizational characteristics and the interpersonal trust between boundary-spanners (Perrone et al., 2003). Overall, the relationship between inter-personal and inter-organizational trust has received abundant research attention, but unanswered questions remain about the contingencies under which it influences inter-organizational trust and its outcomes.

2.7 Trust in Supply Chain Relationships

Trust is a critical factor fostering commitment among supply chain partners. The presence of trust improves measurably the chance of successful supply chain performance. A lack of trust among supply chain partners often results in inefficient and ineffective performance as the transaction costs (verification, inspections and certifications of their trading partners) mount (Kwon & Suh, 2004). Successful supply chain performance is based on a high level of trust and a strong commitment among supply chain partners. Effective supply chain planning based on shared information and trust among partners is an essential requirement for successful supply chain management. One study reported that one-third of strategic alliances failed due to a lack of trust among trading partners (Sherman 1992). Information sharing sometimes requires a release of guarded financial, strategic and other operating information to partners who might have been and/or will be competitors, since "effective information sharing is heavily dependent on trust beginning within the firm and ultimately extending to supply chain partners" (Bowersox et al. 2000).

It has been argued that "issues of trust and risk can be significantly more important in supply chain relationships, because supply chain relationships often involve a higher degree of interdependency between competitors" (La Londe 2002). A lack of trust among trading partners often creates a condition where every transaction has to be scrutinized and verified, thereby increasing the transaction costs to an unacceptably high level. Productivity is lost and efficiency and effectiveness, cornerstones of supply chain goals, will be compromised (Kwon & Suh, 2004). Empirical studies supported that the full benefits of a supply chain integration strategy can be obtained if there is close understanding and trustworthy collaboration between the supply chain partners such as suppliers and manufacturers (Eng, 2006; Li et al., 2007; Roy et al., 2004). This is because the parties can understand each other’s business better and assist each other in improving the supply chain process via innovative solutions. Trust has been a central concept in the quest to identify predictors of performance in business relationships in various industrial sectors and in the supply chain (Carr and Pearson, 1999; Ireland and Webb, 2007). In addition, the concept of innovativeness is integral in the quest for improving quality and performance (Mone et al., 1998). Central in the

quest for competitive advantage in the supply chain is innovativeness that facilitates developments in information and related technologies with new operational procedures to improve efficiency and enhance service effectiveness (Bello et al., 2004).

In the supply chain network context specifically, the effectiveness of collaboration is dependent on a firm's initiatives to build and foster trust with its partners, which can improve responsiveness even when the suppliers have more power than buyers in the supply chain. For instance, Lin et al., (2005) evaluation of the effect of trust mechanisms on supply chain performance clearly shows that trust mechanisms reduce the average cycle time and increase in-time order fulfilment rate, especially when the environment is highly changeable.

Kim (2009) also concludes that the trust relationship between firms, whose symmetrical levels emerge from the firms' self-organizing processes, can reduce the variability of inventory levels. Panayides and Lun (2009) provide empirical evidence that trust affects not only supply chain performance but also innovation, and Zhang and Huo (2013) also use empirical research to show that trust with customers/suppliers significantly influences supply chain integration which can improve supply chain financial performance profoundly.

The relevance of trust as an influential variable in supply chain relationships has been particularly recognized in the operations management literature (Cousins and Menguc, 2006; Johnston et al., 2004; Ireland and Webb, 2007). Despite this, several authors have acknowledged the paucity of research involving trust in supply chains (Johnston et al., 2004; Ireland and Webb, 2007; McCutcheon and Stuart, 2000). Even those studies that have analyzed trust in supply chains offered conceptual models (Johnston et al., 2004) or utilized an economics approach (Handfield and Nichols, 2002; Kwon and Suh, 2005). Important issues remain to be analyzed with respect to empirically determining the causal influences of trust, particularly with respect to performance consequences in the supply chain, i.e., whether trust has a positive effect on several supply chain performance metrics including decision-making activities.

2.8 Trust in Computer Mediated Communication

Computer-mediated communication (CMC) technologies supports interaction between people in many areas such as business and education today. Within the traditional framework of task performance, user satisfaction and user cost (Shackel, 1991), HCI researchers have investigated task effectiveness and efficiency (e.g. Olson et al., 1995) and users' ratings of audio and video quality (e.g. Watson and Sasse, 1996) to decide whether technologies can effectively support interaction. In recent years, the scope has been broadened to investigate more subtle and complex effects of the technologies on users themselves (such as their physiological responses; Wilson and Sasse, 2000), their performance on highly complex tasks (such as the ability to detect deception; Horn, 2001) and on interaction style or patterns (Monk and Watts, 2000; Vertegaal et al., 2001). The current focus of investigation is the degree to which users assess trustworthiness and establish trust in each other when interacting via CMC technologies. Trust is an important consideration for two reasons:

1. Mediated interactions carry an increased risk. As users might be placed in different contexts or cultures, misunderstandings become more likely and enforcement of agreements and regulations becomes more difficult. As risks increase and become more difficult to evaluate, users of collaborative technologies face more complex decisions. Trust helps to reduce this complexity; it is a shortcut for a full-scale, laborious evaluation of the risks and benefits involved (Luhmann, 1979; Adams and Sasse, 2001; Lahno, 2002a). Hence, CMC requires more a priori trust than face-to-face interaction.

2. Many users of advanced communication technologies state that they find it hard to develop trust with someone they cannot see face-to-face. This problem is commonly attributed to the fact that these technologies do not convey the full richness of face-to-face encounters. They omit cues that are thought to be crucial for trust-building (Whittaker and O'Connaill, 1997; Doring, 1998; Mitra, 2002).

Thus, as communication technologies replace face-to-face encounters, there is the danger of a proliferation of low-trust interactions. In the long run, low-trust interactions are more costly than trust-based interactions due to the increased need for contractual agreements and external enforcements (Diekmann and Lindenberg, 2001; Handy, 1995). CMC turn out to be not fully appropriate when the prerequisite for action is the establishment of trust. An action demonstrates trust if it 'increases one's vulnerability to another whose behavior is not under control". Field evidence shows that people engaged in computer-based media of such activities are reluctant to use computer-based media communication because the lack of face-to-face contact reduces trust and commitment.

Others report need for a prior face-to-face meeting before accepting electronic mail or video-conference as an alternative to face-to-face communication. Reluctance toward electronic media of communication appears to be particularly strong when vulnerability derives from the risk of individualistic or deceitful behaviors. When no standardized procedures or hierarchy guarantee control on individual behaviors, uncertainty and therefore vulnerability increase. In this situation, mutual adjustment and trust are the only coordination mechanisms able to make an organization survive. However, mutual adjustment and trust are very delicate resources rooted in the flow of informal face-to-face reluctant (Rocco, 1998).

2.9 Proposed Model of Trust

Figure 2.5 below is the proposed model of Trust by Mayer, R.C & Davis, (1995) that become a key reference in this research. The characteristic of trust available in this model become the measurement for trust attributes found in the empirical findings. Model of trust by Meyer et al., (1995) becomes the main measuring characteristics of trust attributes which then create the trust development. However, the researcher also compare trust attributes in Meyer's model to other available models (Zaheer et al., 1995, 1998, 2002; Ireland & Webb, 2007) which is basically using the same concept but interpret it in different meaning.

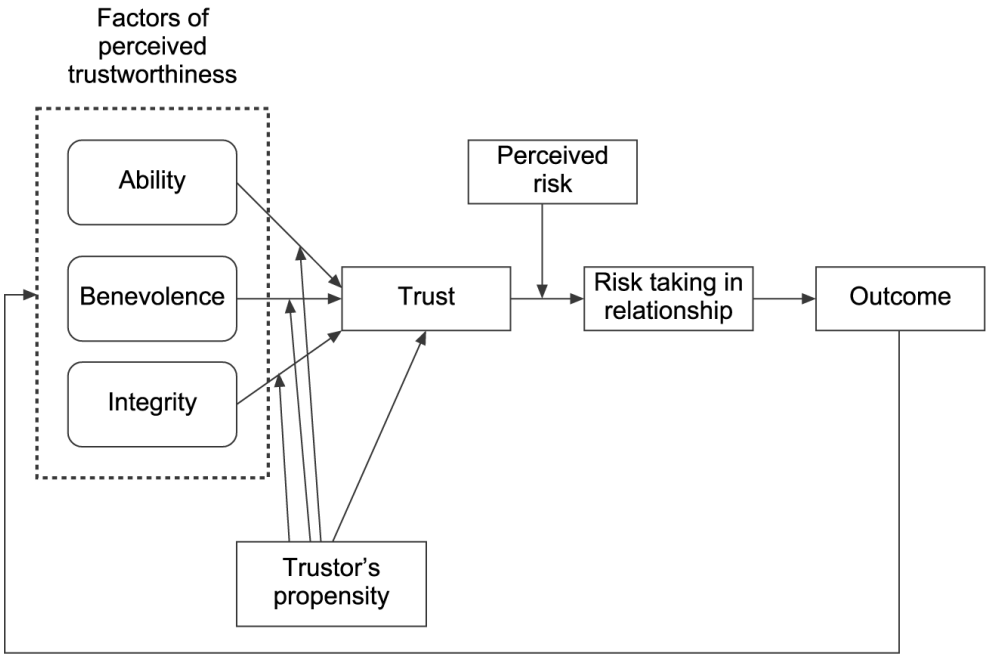


Figure 2.5 Model of Trust (Mayer, Davis, & Schoorman, 1995)

2.9.1 The Factor of Trustworthiness

Three characteristics of a trustee appear often in the literature: *ability, benevolence, and integrity* (Mayer, R.C & Davis, 1995). As a set, these three appear to explain a major portion of trustworthiness. Each contributes a unique perceptual perspective from which to consider the trustee, while the set provides a solid and parsimonious foundation for the empirical study of trust for another party.

Table 2.6 The Factor of Trustworthiness (Mayer et al., 1995)

Ability	Ability is that group of skills, competencies, and characteristics that enable a party to have influence within some specific domain. The do- main of the ability is specific because the trustee may be highly competent in some technical area, affording that person trust on tasks related to that area. However, the trustee may have little aptitude, training, or experience in another area, for instance, in interpersonal communication. Although such an individual may be trusted to do analytic tasks related to his or her technical area,

	the individual may not be trusted to initiate contact with an important customer.
Benevolence	Benevolence is the extent to which a trustee is believed to want to do good to the trustor, aside from an egocentric profit motive. Benevolence suggests that the trustee has some specific attachment to the trustor. An example of this attachment is the relationship between a mentor (trustee) and a protégé (trustor). The mentor wants to help the protégé, even though the mentor is not required to be helpful, and there is no extrinsic reward for the mentor. Benevolence is the perception of a positive orientation of the trustee toward the trustor.
Integrity	The relationship between integrity and trust involves the trustor's perception that the trustee adheres to a set of principles that the trustor finds acceptable. The issue of acceptability precludes the argument that a party who is committed solely to the principle of profit seeking at all costs would be judged high in integrity (unless this principle is acceptable to the trustor). Such issues as the consistency of the party's past actions, credible communications about the trustee from other parties, belief that the trustee has a strong sense of justice, and the extent to which the party's actions are congruent with his or her words all affect the degree to which the party is judged to have integrity.

2.10 Discussion and Conclusion

An extensive exploratory literature has been discussed in Chapter 2 that given an idea of the scope of this research. There might be involved a number of research areas but they are inter-related with each other. Initially, Chapter 2 discussed on E-Collaboration Technologies in the context of Supply Chain and the factors of trust that affect the computer mediated communication. It started with the overview of E-Collaboration

Technologies and the evolutions since 1970s until recent. Then the researcher start to relate the adoption of E-Collaboration Technologies in the supply chain area. A comparison between the methods of communication between computer mediated communication and face-to-face has been discussed. After giving an explanation in the context of E-Collaboration Technologies, it was deem to understand the role of inter-organizational trust as an overview and the relation to the supply chain process. This chapter has also discussed the role of trust in computer mediated communication. The model of trust by Mayer et al. has been introduced which become the key reference in the trust context of this research.

Next chapter is an in-depth discussion on some other factors that is related to the collaborative decision-making in Supply Chain it is including review on the managerial decision-making context as well as decision making in Supply Chain Management which underpinned the research questions. Chapter 3 will also demonstrate the conceptual framework of this research and presenting the answer to Research Question 1 which is important to understand the types of collaborative decisions that have been made in Supply Chain.

Research Question 1 that will be answered in Chapter 3 is as below:

RESEARCH QUESTION 1:

What are the types of collaborative decisions that are made in Supply Chain?

CHAPTER 3

FOCUSED LITERATURE REVIEW

3.1 DECISION-MAKING: The Essence of Management Decision

The management decision constitutes the most important thing that managers do. As stated by Herbert A. Simon, a Nobel Prize winner in Economics 1978*; "Managers should treat decision-making as a process synonymous with the whole process of management"* (Simon, 1960). Managers make decisions with expectations for success. Managers are invariably rewarded for effective decision-making and criticized or censured for failure in decision-making. The prerequisite of effective management is a track record of decision success. It is the most meaningful measure of managerial merit, the most significant contribution that management can make in any kind of formal organisation (Harrison, 2000).

There are various kinds of management decisions, and it is important to able to differentiate decisions made by managers in organisations. What is the difference between decisions made by managers in the performance of their duties and responsibilities and other decisions made by the same managers in a totally different setting? In essence, what is it that differentiates decisions that we normally and properly consider as management decisions from similar decisions that are erroneously regarded as management decisions (Harrison, 2000). Management decision has been defined in many ways. As suggested by Ofstad, *"… to say that a (manager) has made a decision may mean: (1) that he (or she) has started a series of (actions) in favour of something, or it may mean (2) that he (or she) has made up his (or her) mind to do a certain (thing)… But perhaps the most common use of the term is this: "to make a decision" means (3) to make a judgment regarding what one ought to do in a certain situation after having deliberated on some alternative courses of action",* (Ofstad, 1961).

In this research, the researcher apply the decision's definition suggested by Harrison (1999); a decision is defined as *"A moment in an ongoing process of evaluating alternatives for meeting an objective, at which expectations about a particular course*

of action impel the decision maker to select that course of action most likely to result in attaining the objective".

3.1.1 Process of Management Decision

Harrison & Francisco, (1996) and some other researcher on management literature discussed perspectives that linked to constitute a process of managerial decision-making as demonstrate in Figure 3.1.

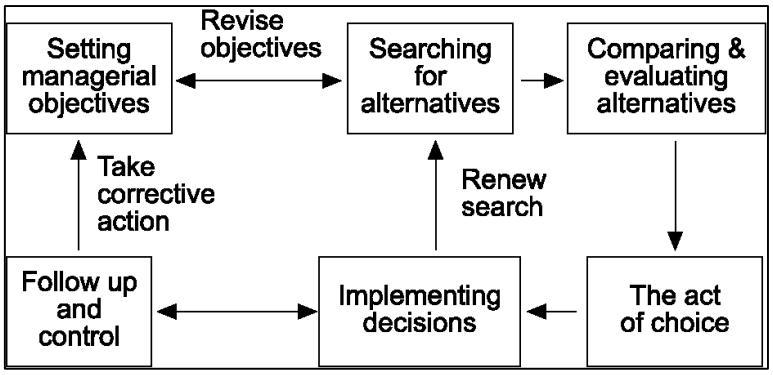


Figure 3.1 The managerial decision-making process (Harrison, 1999)

The elements of decision-making process are the functions of decision-making. The functions are discussed by Harrison & Francisco (1996) as details below:

- **Setting managerial objectives.** "Decision-making commences with the setting of objectives, and a given cycle is completed on attaining the objective that initiated the cycle".

- **Searching for alternatives.** "Search involves scanning the internal and external environment for relevant information from which to fashion a set of alternatives likely to fulfill the objective".

- **Comparing and evaluating alternatives.** "Alternatives are compared and evaluated using applicable techniques and criteria related to the objectives".

- **The act of choice.** "The decision maker selects a course of action from among a set of alternatives".

- **Implementing the decision.** "The decision is transformed from an abstraction into an operational reality".

- **Follow-up and control.** "Ensuring that the implemented decision has an outcome coincident with the managerial objective that initiated the process".

3.1.2 Dimensions of Management Decision

Referred to Harrison (2000), his article has revealed several key dimensions of management decision as Figure 3.2.

Figure 3.2 The dimensions of management decision (Harrison, 2000)

- **Organisation.** "The locus of management decisions is formal organisation. Management decisions are made by practicing managers in pursuit of organisational objectives. These objectives constitute the essential underpinning for management decision".

- **Level.** "Strategic decisions are made by top management, and Category II decisions are made by upper management and middle management. Operating management makes the Category I decisions necessary to facilitate the

implementation of Category II decisions made by higher levels of management".

- **Significance.** "Management decisions are essential to the long-term well-being of the entire organisation. These decisions constitute the most significant activity of management. The ultimate measure of organisational effectiveness and managerial success is a track record of decisions that measurably contribute to organisational growth and prosperity".

- **Rationality.** "Management decisions are eminently rational in that they are unalterably oriented towards the attainment of the organisation's long-term objectives. No other type of decision can justifiably make this assertion".

- **Strategy.** "The strategy of the total organisation is keyed to management decisions. Strategy indicates how and when the organisation's objectives are to be attained; and the attainment of the objectives is accomplished through management decisions. Therefore, strategy is an integral part of management decisions".

- **Outcome.** "The expected outcome of a given management decision is the attainment of the objective that initiated the managerial decision-making process. Successful outcome are more likely to ensue from a managerial attitude oriented toward satisfying rather than maximizing a given result".

- **Uncertainty.** "The presence of uncertainty attendant on a given outcome is a constant in management decision. Uncertainty can never be eliminated from management decision. However, its occurrence can be reduced to acceptable proportions through the assimilation of the theories and concepts".

Decision Category I (Operational level):
The decisions are routine and recurring with fairly certain outcome. Usually occurs at lower levels of management. Most of these decisions do not require a managerial decision maker.

Decision Category II (Strategic level)*:*
The decisions are non-routine and non-recurring., with a lot of uncertainty inherent in the outcome. The primary form of management decision is in this category. These decisions are made for the most part by middle and upper level managers.

Figure 3.3 Category I and Category II Decisions (Simon, 1987)

3.1.3 Characteristics of Managerial Decisions

Figure 3.4 illustrate several characteristics of managerial decisions that contribute to the difficulty and pressure of decision-making. Most managerial decisions lack structure and entail risk, uncertainty and conflict.

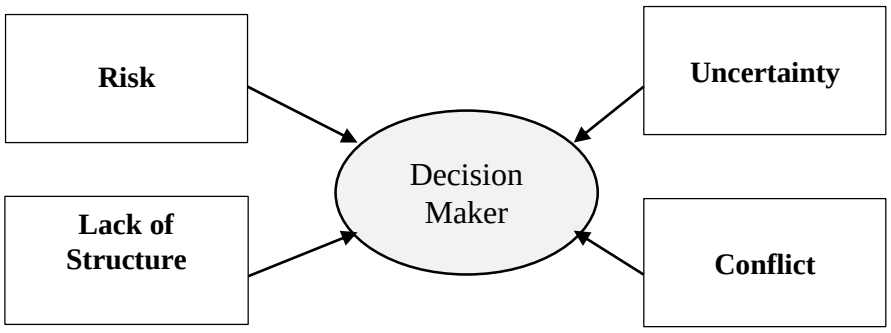


Figure 3.4 Characteristics of Managerial Decisions (Thomas Bateman and Scott Snell, 2012)

Thomas Bateman and Scott Snell in their book titled *Management: Leading and Collaborating in Competitive World, 10th edition (2012)* explain the characteristics of managerial decision as follows;

- **Lack of structure.** "The usual state of affairs in managerial decision making. Although some decisions are routine and clear-cut, for most there is no automatic

procedure to follow. Problems are novel and unstructured, leaving the decision maker uncertain about how to proceed".

- **Risk.** "Exists when the probability of an action being successful is less than 100 percent and losses may occur. If the decision is the wrong one, you may lose money, time, reputation, or other important assets. Risk, like uncertainty, is a fact of life in managerial decision making. But this is not the same as taking a risk. Although it sometimes seems as though risk takers are admired and entrepreneurs and investors thrive on taking risks, the reality is that good decision makers prefer to manage risk. They accept the fact that decisions have consequences entailing risk, but they do everything they can to anticipate the risk, minimize it, and control it".

- **Uncertainty.** "Means the manager has insufficient information to know the consequences of different actions. Decision makers may have strong opinions and they may feel sure of themselves but they are still operating under conditions of uncertainty if they lack pertinent information and cannot estimate accurately the likelihood of different results of their actions".

- **Conflict.** "Important decisions are even more difficult because of the conflict managers have to face. Conflict is opposing pressure from different sources, occurring on the level of psychological conflict or of conflict between individuals or groups, which exists when a manager must consider opposing pressure from different sources, occurs at two levels":

    1. First, individual decision makers experience psychological conflict when several options are attractive, or when none of the options is attractive. For instance, a manager may have to decide whom to lay off, when she does not want to lay off anyone. Or she may have three promising job applicants for one position—but choosing one means she has to reject the other two.

    2. Second, conflict arises between people. A chief financial officer argues in favour of increasing long-term debt to finance an acquisition. The chief executive officer, however, prefers to minimize such debt and find the

funds elsewhere. A marketing department wants more product lines to sell, and the engineers want higher-quality products. But the production people want to lower costs by having longer production runs of fewer products with no changes. Few decisions are without conflict.

3.1.4 Nature of Decisions

Decision making is a complex task, to resolve the complexity the nature of decision are of two types as suggested by Richard M. Cyert, (1956):

- **Routine decision: Programmed / Structured Decision.** "If the decision can be based on a rule, methods or even guidelines, it is called a programmed or structured decision. Programmed / structured decision are those decisions, which are well defined and some specified procedure or some decision rule might be applied to reach a decision. Such decisions are routine and repetitive and require little time for developing alternatives in the design phase. Programmed / structured decisions have traditionally been made through habit, by operating procedures or with other accepted tools".

- **Non-routine decision: Non-programmed / Unstructured Decision.** "A decision which cannot be made using a rule or model is the non-programed / unstructured decision. Decision, which are not well defined and have not pre-specified procedures decision rule are known as non-programmed or unstructured decisions".

Table 3.1 Nature of Decisions (Richard M. Cyert, 1956)

	Programmed Decisions	**Non-programmed Decisions**
Problem	Frequent, repetitive, routine. Much certainty regarding cause-and-effect relationship.	Novel. Unstructured. Much uncertainty regarding cause-and-effect relationship.
Procedure	Dependence on policies, rules and definite procedures.	Necessity for creativity, intuition, tolerance for ambiguity, creative problem solving.

3.1.5 Decision-making Styles

Generally, people differ in their attitude to making decisions, it is called decision-making styles. Decision-making styles proposed that people differ along two dimensions in their way of making decisions. The first is an individual's way of thinking, some people tend to be rational type looks at information in order and makes sure it is logical and consistent before making a decision. Others tend to be creative and intuitive, this types of people do not have to process information in a certain order but are comfortable looking it as a whole.

The measurement of decision-making styles basically refers to the Model of Decision-making Styles (Rowe & Boulgarides, 1983) and adopted by Stephen P. (2010) in his book of Management 5th edition. Based on the output from data analysis, the researcher looks at the characteristics of collaborative decision-making between the collaborated partners and compare it with the characteristics from the model as a measurement. The measurement of decision-making styles are basically rely on the most accurate characteristics presented in the model. Stephen P. Robbins et al. (2010) in the book *Management 5th* edition mentioned four types of decision-making style as in Table 3.2 that become an important concepts in this research.

Table 3.2 The decision-making styles (Stephen P. Robbins et al., 2010)

Decision-making Styles	Descriptions
Conceptual Style	The leader explains the situation to the group or individuals whom he provides with relevant information, and together they generate and evaluate many possible solutions. This style tends to be have a long-term perspective and, as a result, will be more creative and expansive in their approach entailing a higher level of risk for the long-term benefit of the organisation.
Behavioural Style	The leader explains the situation to the group or individuals and provides the relevant information. Together they attempt to reconcile differences and negotiate a solution that is acceptable to all parties. The leader may consult with others

	before the meeting in order to prepare his case and generate alternative decisions that are acceptable to them.
Analytical Style	When the leader does not possess sufficient information to make an effective decision, they will need to obtain information or skill from others. They may not tell them what the problem is; normally, they simply asks for information. The leader then evaluates the information and makes the decision.
Directive Style	The group leader solves the problem, using the information he possesses. He/she does not consult with anyone else nor seek information in any form. This style assumes that the leader has sufficient information to examine all the relevant options and make an effective decision, but that is rarely the case.

Decision-making style is an important work-related attitude which is crucial for managerial performance and collaboration with other organisations. Kaur (1993) argues that the effectiveness of any organisation depends, not only on the technological efficiency of the organisation, but also to a large extend on the managerial approach to decision-making. There are actually different factors influencing the decision style in organisation. Yukl (1994) mentioned the opinion that patterns of organisation and individual characteristics influence the decision styles, while Hofstede (1980) and Tayeb (1998) believe that cultural background influences decision styles.

To deal with the decision-making style, the background of the decision itself; whether it is a *complex decision* or *simple decision* are factors that affect the decision-making style. Bennet & Bennet, (2008) mentioned that a *complex* situation in a complex environment mean one that may be difficult to define and may significantly change in response to some solution; may not have a single "right answer"; has many interrelated causative forces; has no (or few) precedents; has many stakeholders and is often surprise prone. These complex situations may be within an organisation, a part of the organisation, in the organisation's external environment or at the boundaries of two complex systems. While a *simple* decision is characterized by stability and clear cause-

and-effect relationships that are easily discernible by everyone. Often, the right answer is self-evident and undisputed. In this realm of "known knowns," decisions are unquestioned because all parties share an understanding. Areas that are little subject to change, such as problems with order processing and fulfillment, usually belong here (David S. and Mary B., 2007)

Decision style is defined as how people make decisions in various situations. According to Rowe′s model (Rowe & Boulgarides, 1983) the decision style is built on two dimensions: how individuals perceive information (cognitive complexity) and how individuals evaluate information (values orientation). High tolerance and low tolerance for ambiguity are two mental functions of the cognitive complex dimension. Task (technical) and people (social) are two types of judgements in the value dimension. Based on the two dimensions, four decision styles (directive, analytical, conceptual, and behavioural) are described in Figure 3.5.

Importantly, an understanding of the relationship between decision-making style and background of the decision adopted by decision makers will help the researcher to identify suitable decision-making style implemented in the case studies.

	High tolerance for ambiguity	Low tolerance for ambiguity
Technical	**ANALYTICAL** • Enjoys problem solving • Wants best answers • Thrives on control • Uses large volumes of data • Enjoys variety • Innovative • Uses great care in analysis	**CONCEPTUAL** • Achievement oriented • Generally broad outlook • Creative • Humanistic/artistic • Regularly initiates • Futuristic thinker
Social	**DIRECTIVE** • Expects results • Aggressive nature • Tends to react quickly • Relies heavily on rules • Intuitive in nature	**BEHAVIOURAL** • Generally supportive • Very persuasive • Relies on limited data for analysis

Figure 3.5 Decision-making style model (Rowe & Boulgarides, 1983)

3.1.6 The Circumplex Model of Group Task Types

According to the Circumplex Model of Group Task Types (McGrath, 1984), there are important to identify the task classification. Variation between the channel of communication in group process and outcome is dependent on or interacts with task types. Therefore, in an attempt to evaluate the influence of task types on medium of communication adopted in collaborative decision-making that become the objective of this research, model from (McGrath, 1984) has been referred, and the findings will be discussed in Chapter 6 and 7.

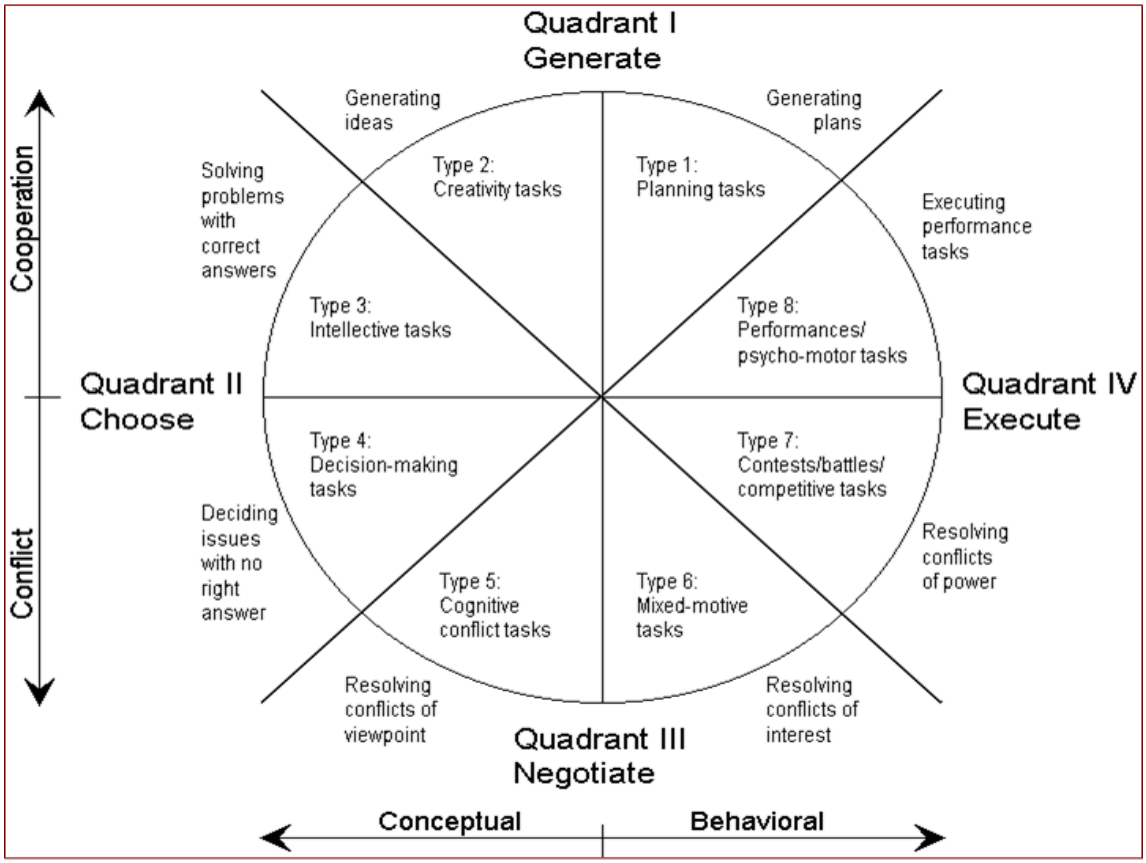


Figure 3.6 Circumplex Model of Group Task Types (McGrath, 1984)

This classification system separates tasks into the following four quadrants:

1. Generating
2. Choosing
3. Negotiating
4. Executing

According to Straus and McGrath (1994) the quadrants and the tasks they contain are related to one another within a two-dimensional space. The horizontal dimension reflects the degree to which the task entails cognitive (choosing) versus behavioral performance requirements (executing). The vertical dimension reflects the degree and form of interdependence among group members (generating versus negotiating).

Based from McGrath's (1984) circumplex model, two types of tasks are included within each quadrant:

Quadrant I (Generate) "Contains planning tasks and creativity tasks. Planning tasks involve generating plans or problem solving and the essential notion is developing an action-oriented plan. Creativity tasks, on the other hand, involve generating ideas (e.g., brainstorming tasks) and the essential notion is creativity".

Quadrant II (Choose) "Contains intellective tasks and decision-making tasks. Intellective tasks are tasks that involve solving problems with verifiably correct answers. These types of tasks include logic problems or tasks for which expert consensus defines the solution. Decision-making tasks, on the other hand, are tasks for which the group's agreed-upon answer is the correct solution. The essential notion here involves the group determining a preferred answer".

Quadrant III (Negotiate) "Contains cognitive conflict tasks and mixed-motive tasks. Cognitive conflict tasks (e.g., some jury tasks) involve resolving conflicts of viewpoint. Mixed-motive tasks, on the other hand, involve resolving conflicts of motive-interest and include negotiation, bargaining, mixed-motive dilemma, and coalition formation/reward allocation tasks. The essential notion here is resolving payoff conflicts".

Quadrant IV (Execute) "Includes contests / battles and performance tasks. Contests/battles are tasks dealing with resolving conflicts of power or competing for victory. The essential notion here is winning. Performance tasks, on the other hand, involve psychomotor tasks performed against objective or absolute standards of excellence. These types of tasks include physical tasks and the essential notion is exceling".

The relationship of the decision-making styles and the task types will be discussed in the within-case analysis and cross-case analysis where it will be the backbone of the research findings.

3.2 Supply Chain Collaboration and Integration

A supply chain consists of all parties involved, directly or indirectly, in fulfilling a customer request. The supply chain not only includes the manufacturer and suppliers, but also transporters, warehouses, retailers, and customers themselves. Within each organisation, such as a manufacturer, the supply chain includes all functions involved in receiving and filling a customer request. These functions include, but are not limited to, new product development, marketing, operations, distribution, finance and customer service (S. Chopra & P. Meindl, 2001). Today, supply chain management is believed to be the integral management solution to minimize supply chain inefficiencies and fulfill the customer demand effectively. Supply chain management can be described as all the firms involved in ensuring that the final customer receives the right product, at the right costs, at the right time, in the right condition, and in the right quantity (Coyle et al., 1996). Muckstadt et al. (2001) postulate that a supply chain can be thought of in terms of interconnected business systems. These systems relate to engineering the manufacturing and delivery process in order to create the products, manufacturing to produce products in a reliable and cost effective manner, logistics to efficiently and effectively provide raw materials and components to supply chain partners and finished goods to customers, and management to ensure that the operations are designed and executed properly.

Bechtel, C. & Jayaram, (1997) suggest that there are different schools of thought in supply chain management that also describes the evolution of supply chain thinking. The Functional awareness school of thought recognizes the existence of a chain of functional areas that need to be coordinated. The Linkage/Logistics school goes beyond recognizing that there is chain from suppliers to end users and begins to address the material flows through this chain. The linkage school begins to investigate how linkages among the functional areas can be exploited from competitive advantage.

The Information school emphasizes the flow of information between the supply chain members. The Integration/Process school considers the supply chain as set of processes that strive for customer satisfaction regardless of the configuration of the functional areas in the supply chain. While the linkage school assumes that the functional areas appear in a sequence that cannot be changed, the decision maker in the integration/process school is free to explore alternative configurations of the supply chain.

Another school of thought has emerged in supply chain literature: supply chain collaboration. Supply chain collaboration has been described in many ways, referring to a diverging set of terms and definitions. Among these, the following terms illustrate the philosophy and concept on the supply chain collaboration. Supply chain collaboration can be described (McCarty & Golicic, 2002) as a business tool that builds sales (Citera et al., 1995); as a process for parties to jointly search for solutions. Anderson & Lee (1999, 2001) state that supply chain synchronization encompasses the collaboration among supply chain partners to fine-tune the operations. It comprises supply chain design, collaborative manufacturing, and integrated fulfillment. Mentzer et al. (2000) define supply chain collaboration as a long-term relationship among organisations actively working together as one toward common objectives. Anthony (2000) specifies how organisations cooperate: "Supply chain collaboration occurs when two or more companies share the responsibility of exchanging common planning, management, execution and performance measurement information; collaborative relationships transform how information is shared between companies and drive change to the underlying business processes".

Boorsma en van Noord (1992) group the above mentioned and other types of cooperative activities into four types of supply chain integration:

- **Physical Integration.** "Refers to changes in processes and activities that aim to improve the efficiency of the primary process. As a result of improving the interface between two companies the logistics costs can be reduced. Two main types of improvements are adjustments or standardization of transport and materials handling equipment and the adjustment or standardization of packaging

and loading units".

- **Information integration.** "Refers to the exchange of information related to inventory levels, manufacturing or transport planning, forecasts, actual status of processes etc. with supply chain partners. Transparency within the supply chain in improved as each company has a view on what is happening elsewhere in the supply chain that might affect demand and its own operations in the near future. This allows companies to anticipate these events and to take appropriate measures. Information integration can also reduce supply chain cycle times. Examples of concepts related to information integration are: use of Point of Sale information in retail supply chains, and the use of pre-alert or pre-arrival information in container transport chains".

- **Coordination integration.** "Refers to the alignment of the decision-making processes along the supply chain. Information from other parts of the chain is systematically used to planning and control activities. The supply chain operates as if it was a single organisation. The primary goals are to realize cost reductions by means of lower inventories along the supply chain and efficient use of resources, and to improve customer service levels. Examples are Efficient Consumer Response (ECR) and Just in Time (JIT). Recently, the concept of collaborative planning, forecast and replenishment (CPFR) has been introduced (Barrat & Oliveira, 2001). Collaborative planning serves for cross-organisational coordination of planning activities of several organisational units (Schiegg et al., 2002). Supply chain inefficiencies, like the "bullwhip" effect, can be counteracted by collaborative supply chain coordination initiatives (Lee et al., 1997). Within this concept, the focus is on designing and operating a joint decision-making process that coordinates the whole material flow between two supply chain partners (Ackerman, 2000; Ireland & Bruce, 2000; Andraski, 1999). The concept of collaborative planning goes beyond earlier concepts like ECR, CPR and VMI because firm share the responsibilities in inventory management".

- **Supply chain design integration.** "Refers to cooperation in which the structure of the supply chain changes. The design of a supply chain involves four design decisions (Christiaanse and Kumar, 2000): the choice of actors in the supply chain, governance mechanisms in the chain, structuring (i.e. sequencing order) of the activities in the chain and the choice of coordination structures in the chain. As a result of design integration tasks and responsibilities may shift from one supply chain partner to another. This shift of tasks and responsibilities exceeds the more traditional outsourcing of logistics or manufacturing activities. An example are the concept of Vendor Managed Inventory in which the task of monitoring the inventory level and triggering of replenishments is transferred from the buyer to the vendor and the concept of consolidarity in which several vendors and/or buyers use the same warehouse or distribution system to gain cost efficiencies".

There are a variety of forms of potential supply chain collaboration, which can be divided into two main categories (see Figure 3.5), first, vertical: which could include collaboration with customers, internally (across functions) and with suppliers; and second, horizontal: which could include collaboration with competitors, internally and with non-competitors, e.g. sharing manufacturing capacity. Internal collaboration can overcome functional myopia, and has the potential to enable internal integration (Stank et al., 2001). A potential danger of internal collaboration is that organisations could achieve internal integration, and have simply created a larger albeit organisational silo (Barratt & Green, 2001). Internal collaboration must be combined with external collaboration, in terms of developing closer relationships, integrating processes and sharing information with customers and suppliers.

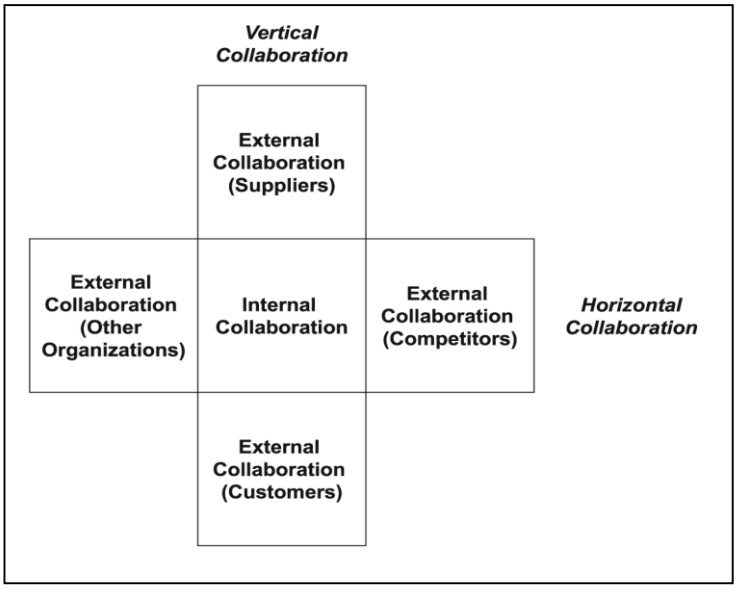


Figure 3.7 The scope of collaboration (Barratt, 2004)

This research (in terms of Manufacturing Supply Chain) is considering the issues of horizontal / external collaboration where it presents a number of potential opportunities for collaboration. Horizontal collaboration occurs when two or more unrelated or competing organisations cooperate to share their private information or resources such as joint distribution centers (Simatupang & Sridharan, 2002). External collaboration (see Figure 3.7) presents a number of potential opportunities for vertical supply chain collaboration which include on the downstream side of the supply chain: customer relationship management (CRM); collaborative demand planning (including CPFR etc.); demand replenishment and shared distribution.

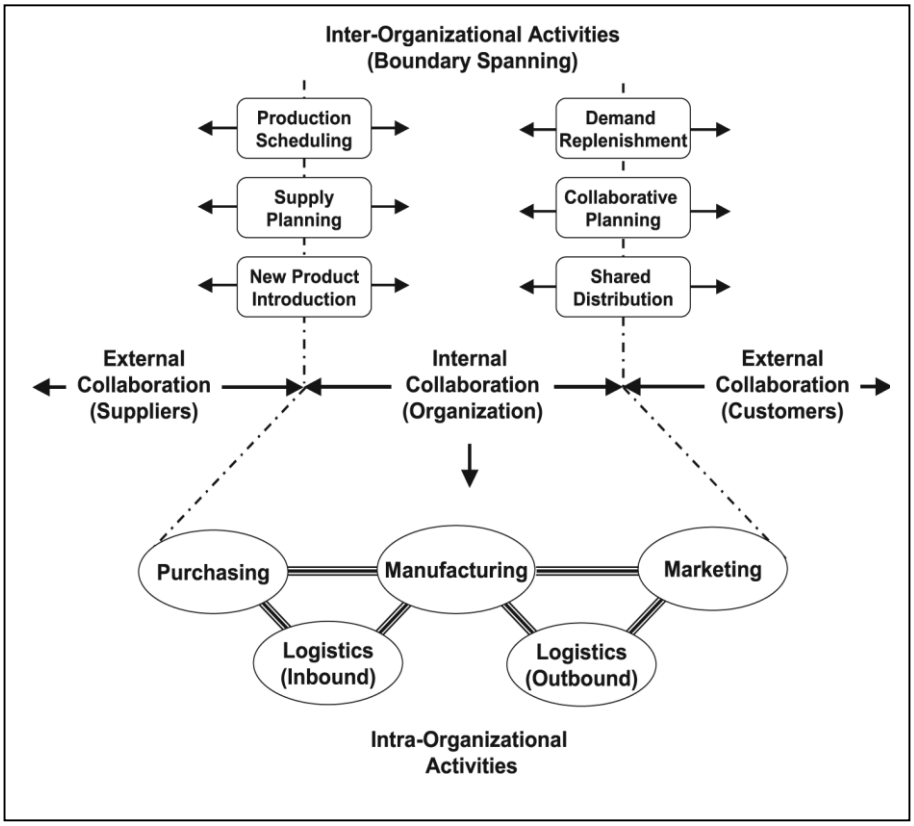


Figure 3.8 The scope of vertical collaboration (Barratt, 2004)

Collaboration is not just about developing close information exchange based relationships at an operational level of activity, but also need to be implemented at tactical and strategic levels in the organisations across the supply chain (see Figure 3.8). Organisations can integrate their processes at an operational level (Khan & Mentzer, 1996), however if processes at tactical and strategic levels are not integrated, then the performance benefits of integration will be limited (Barratt, 2002). Integration at an operational and tactical level can deliver significant benefits, although it is not clear as to the impact of gaps in the strategic levels of integrations (Barratt, 2002).

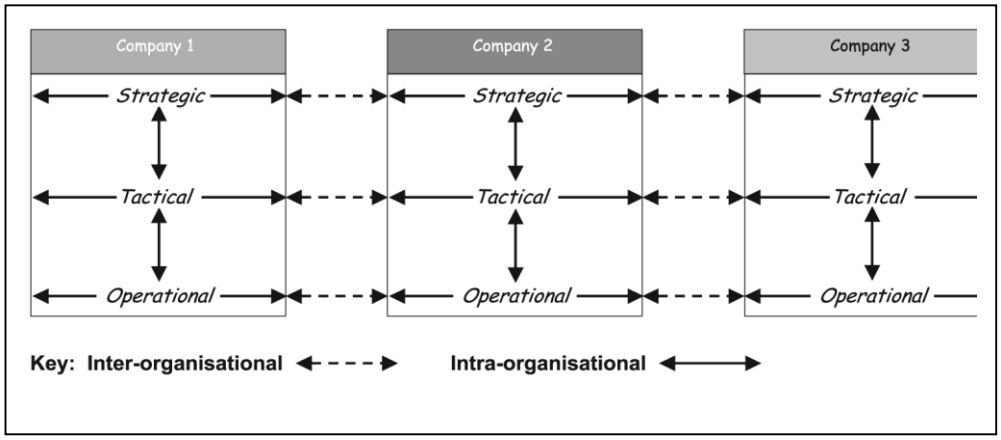


Figure 3.9 Levels of inter-intra-organisational integration (Barratt, 2002)

3.2.1 Elements of Collaboration

There are many elements of collaboration that have been identified in various supply chain management literatures. One of the major supporting elements of collaborative is a "collaborative culture" (see figure 3.9) which is made up of a number of elements: trust, mutuality, information exchange and openness and communication (Barratt, 2004).

Ireland and Bruce, 2002 suggested that most existing corporate cultures are not capable of supporting collaboration either internally or externally. In the inter-organisational relationship, trust has been extensively studied. The consensus in the literature is that trust can contribute significantly to the long-term stability of an organisation (Heide & John, 1990), and Lee and Billington (1992) expand on this argument by suggesting that effective coordination of the supply chain requires a degree of trust between all players, hence the link with partnership/relationship initiatives (Nesheim, 2001). Ellram and Edis, (1996) stated that there have to be mutual benefits arising from the collaboration, it cannot be a case of "I win/ you go and figure out how to win" (Ireland & Bruce, 2000). There must also be mutual risk sharing and respect for the other trading partner (McIvor & McHugh, 2000). A number of authors have highlighted the fundamental need for information sharing if supply chains are to improve their performance (Lambert & Cooper, 2000; Lau & Lee, 2000). Information, particularly the transparency and quality of information flows, plays an important part in many

accounts of supply chain developments and both of the following assumptions: first, intermediation is a potential barrier to greater transparency in supply chain because it acts as a source of information asymmetry and impactness; and second, that intermediation necessarily raises costs and frequently constitutes a non-value adding activity (Popp, 2000). The use of information technology to share data between buyers and suppliers will create a virtual supply chain. Virtual supply chains are information based rather than inventory based. A major problem in most supply chains is their limited visibility of real demand (Christopher & Towill, 2000). Shared information between supply chain partners can only be fully leveraged through process integration. By process integration is meant collaborative working between buyers and suppliers, joint product development, common systems and shared information. This form of collaboration in the supply chain is becoming ever more prevalent as companies focus on managing their core competencies and outsource all other activities (Christopher & Towill, 2000).

It is important to open and develop clear and broad lines of communication (Frankel et al., 2002), to foster information sharing and to create a shared understanding (Ireland & Bruce, 2000). Rather than single points of contact there is a need to develop broad interfaces between organisations, potentially to overcome the lack of internal communication, to create an atmosphere whereby innovative thinking is encouraged and supported (Barratt & Green, 2001), and to avoid the situation whereby with single points of contact, and one person leaves, the whole relationship between the two organisations could be jeopardized (Frankel et al., 2002). From both an internal and external viewpoint, a culture of openness and honesty is needed (Stank et al., 1999b). For example if a delivery is going to be late, the sender should not wait until such time as the promised delivery date has passed, instead the recipient should be inform as early as possible, in order that the recipient can implement contingency plans. Such openness and honesty can develop trust, respect and commitment, as a result of improved certainty and reliability (Whipple and Frankel, 2000).

Figure 3.10 set outs some of the key elements to create a successful collaboration; cross-functional activities, process alignment, joint decision-making and supply chain metrics. There are two elements that give vital impact to my research; cross-functional

activities and joint decision-making. Boundaries within or between organisations have been shown to restrict the flow of information and development of trust between collaborating partners (Forrester & Drextler, 1999; Lee & Whang, 2000; Ellinger, 2001). One example of the need for joint decision-making is in the area of product design, research and development, as well as forecasting area. Currently, most organisations forecast in "isolation", in other words they develop forecasts based on orders they receive from customers and upon historical data (McCarthy & Golocic, 2002).

If the collaboration is to be sustainable then there are a number of strategic elements as suggested by Barratt, (2004). These include resources and commitment, intra-organisational support, the corporate focus, demonstrating the business case and the role of technology. The researcher interested to discuss 'the role of technology' element. Some authors suggested that supply chain collaboration does not need to be based on technology; in fact a major criticism is that an obsession with technology is one of the largest barriers to collaboration (Ireland & Bruce, 2000; McCarthy and Golocic, 2002). In the initial stages of collaboration, use of simplistic technologies (such as email) are likely to be more effective and significantly less expensive than the current raft of collaboration tools being offered by software vendors (Ireland & Bruce, 2000; Barratt & Green, 2001).

However, from researcher point of view, the needs of using current technology will bring collaborative supply chain to a new phase. With various kinds of technology innovation, organisations can take the opportunity to leverage and maximize their collaboration. It can move collaboration on to a closer real-time basis for exchanging and utilizing shared information. The use of internet-based computing and communications to execute both front-end and back-end business processes has emerged as a key enabler to drive supply chain integration (Lee & Whang, 2001).

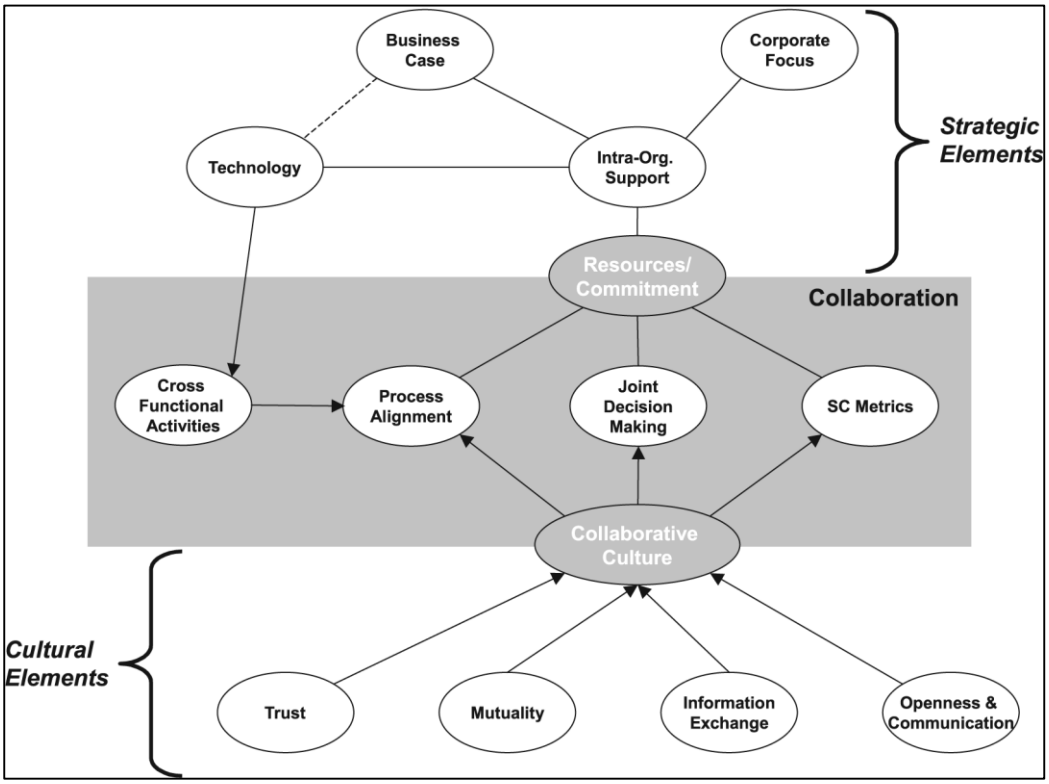


Figure 3.10 The "cultural" elements of supply chain collaboration (Barratt, 2004)

3.2.2 Drivers and Barriers in Collaborative Supply Chains

Strategic supply chain are supply chain where the "members are strategically, operationally and technologically integrated" and are anticipated for long-term stable relationship with the ability to change to the demands of the environment (Hult et al., 2004). In recent years, numerous theories and paradigms have been used by scholars to understand why some strategic supply chains succeed in creating value while others do not. Although perspectives of and prescription to SCM vary, a common idea among scholars is that competitive success for a strategic supply chain is contingent on management's ability to recognize changes in the competitive environment and then direct and coordinate action within and across organisations to utilize resources effectively and meet the demands of the environment (Stonebraker & Afifi, 2004; Fawcett & Magnan, 2001).

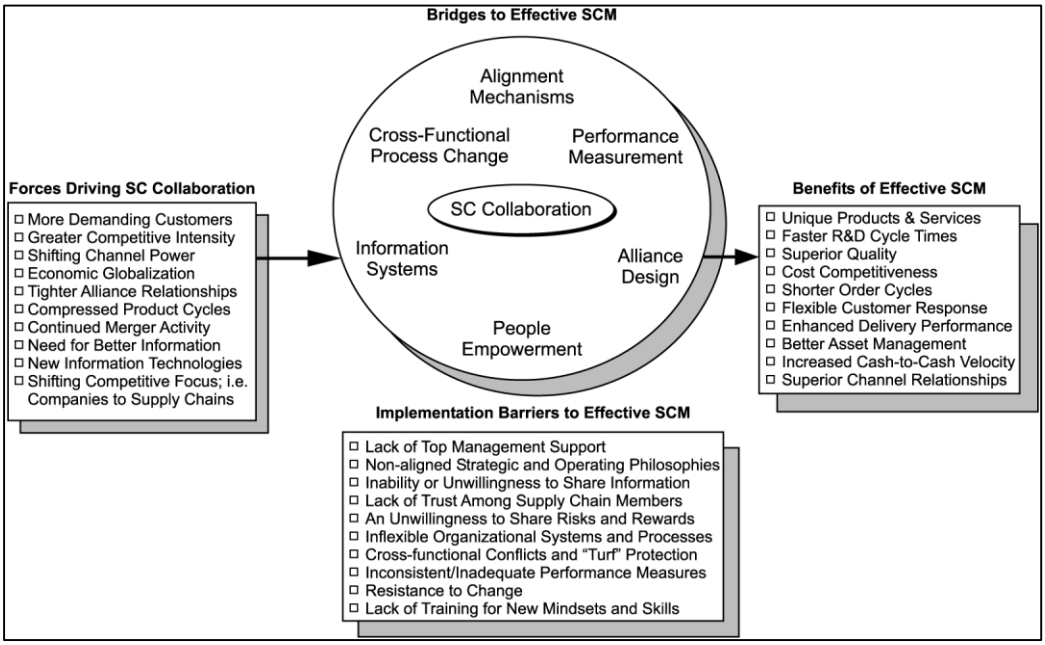


Figure 3.11 A contingency framework for understanding supply chain implementation (Stanley et al., 2008)

The contingency model is driven by dynamic technological innovation, management skills across department and organisational functions, and integration vertically and horizontally across industry (Stonebaker & Afifi, 2004). Such resisting forces include lack of member support, inadequate measurement and information systems, and organisational culture. Nevertheless, organisations are not powerless in terms of choices or their ability in attempting to overcome these barriers. Strategic supply chain partners can create and implement initiatives that bridge the gap between a supply chain and a strategic supply chain. Some of these bridges include people empowerment, information integration and alliances design. Thus, strategic supply chain can create value contingent on their ability to overcome resisting forces through various mechanism. Figure 3.11 shows a contingency framework for understanding SCM implementation.

The driving forces of SCM stem from two sources: external pressures and potential benefits from strategic supply chain alignment. External pressure include such forces as advances in technology and increased customer demand across national borders (Mehta, 2004); maintaining lower costs while meeting these diverse needs (Cook & Garver, 2002); and intensified competition utilizing relationships among vertically

aligned firms (Togar & Ramaswami, 2004). These pressures have begun shifting the focus of individual firms vying for market presence and power to supply chain competing against supply chains (Bhattacharya et al., 1995). The second main driving force entails the potential benefits from successful supply chain collaboration (Balsmeier & Voisin, 1996). Collaboration not only enables partners to reduce one another's costs but also allows inventory to cycle through to customers faster. The two-fold result is increased revenues and decreased costs that can be shared across the chain. Overall, SCM potentially creates value for all members in the chain. However, such benefits vary in importance and degree among partnering chain members (Agrawal & Pak, 2001).

The resisting forces to strategic supply management come both from the nature of the organisation itself and the people that compose the organisation. These barriers can be classified under one of two headings: "inter-firm rivalry" and "managerial complexity" (Park & Ungson, 2011). Inter-firm rivalry is a misalignment of motives and behaviors among allying partners within the strategic supply chain (Park & Ungson, 2011). Some barriers under this category include internal and external turf protection, poor collaboration among chain partners and lack of partners trust. Other barriers to SCM fall under managerial complexity or misalignments in allying firms' processes, structures and culture (Park & Ungson, 2011). Under managerial complexity barriers include information system and technological incompatibility, inadequate measurement systems and conflicting organisational structures and culture (Sheridan, 1999). Because many firms are comfortable using their systems for only their own tasks, it is not surprising to see inconsistent information and technology systems as a barrier. People are change averse and unwilling to share information for fear of exposing their weakness and secrets to others.

Simatupang and Sridharan, (2002b) proposed three collaborative enablers to reflect the intensity of operational interfaces amongst the participating members, namely information sharing, decision synchronization and incentive alignment. Collaborative enablers dictate the amount of mutual actions used to drive supply chain performance. Figure 3.12 depicted the linkage between these three collaborative enablers and a collaborative performance system. Decision synchronization uses key operational

metrics to drive the process of improvement. Information sharing provides visibility of the performance metrics and process status used to make better decisions. Incentive alignment motives participating members to make decisions that contribute to the mutual strategic objectives. These three collaborative enablers drive the shared supply chain processes that leads to better supply chain performance.

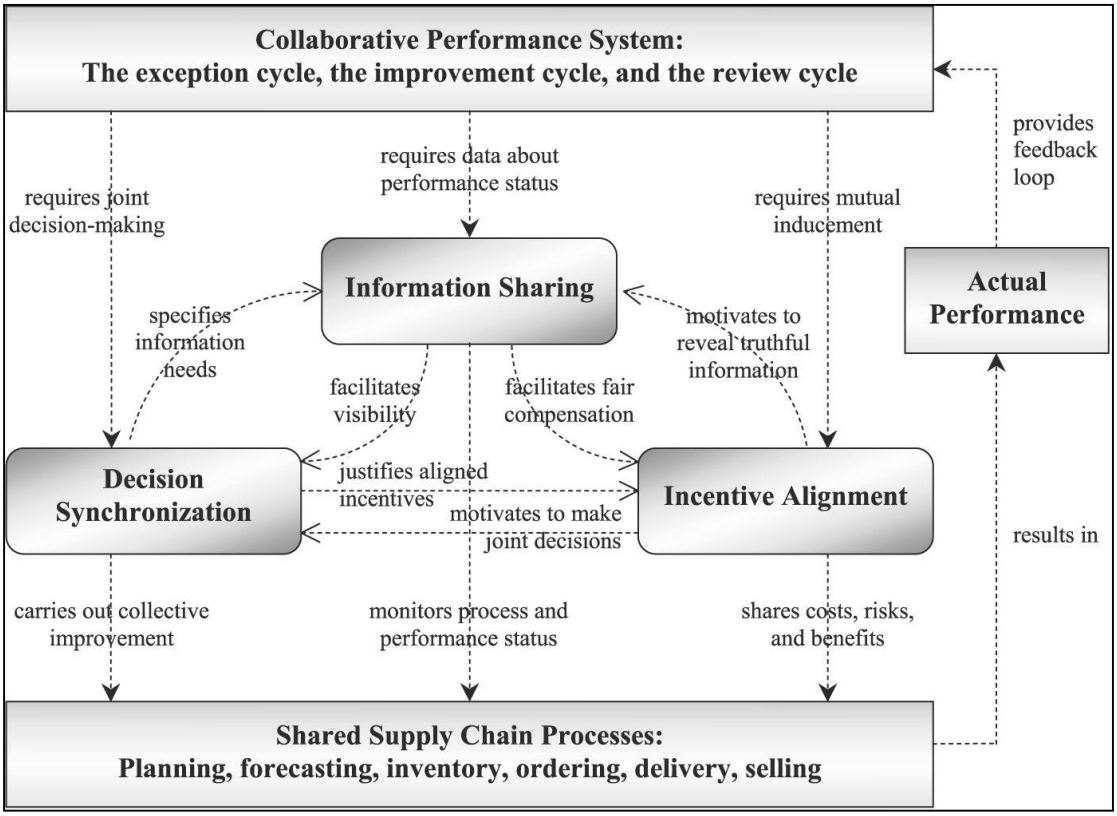


Figure 3.12 The framework for collaborative enablers (Simatupang & Sridharan, 2002b)

Information sharing refers to the ability to see private data in a partner's systems and monitor the progress of products as they pass through each process in the supply chain (Simatupang & Sridharan, 2002b). This activity covers monitoring (data capturing), processing, and dissemination of customer data, end-to-end inventory status and locations, order status, costs-related data, and performance status. Information sharing generally facilitates the decision-making process, the collaborative progress assessment, and incentive alignment. For example, demand and inventory visibility can be used to eliminate stock-outs and remove products that are not selling (Fisher, 1997). Several criteria, such as speed, accuracy, timeliness, and reliability, can be used

to judge the contribution of information sharing to supply chain integration. Advanced technology such as the Internet can be used to convey up-to-date data about product movements, workflow, costs, and performance scoreboard.

Decision synchronization can be defined as the ability to orchestrate decisions at different managerial levels and time horizons for pursuing the common goal of optimizing the supply chain profitability (Simatupang et al., 2002). Advanced technology such as a decision support system and virtual discussion forum can be used to implement decision synchronization effectively. For example, the use of an automated alert system in the exception cycle supports mutual response across the supply chain for satisfying customer demands. Incentive alignment refers to the process of sharing costs, risks, and benefits amongst the participating members (Simatupang & Sridharan, 2002b).

This scheme motivates the members to act in a manner consistent with the mutual strategic objectives such as making decisions that are optimal for the overall supply chain and revealing truthful private information. The three collaborative enablers can be used to measure the level of the best enabling practice. For example, real-time information sharing is expected to drive better performance than piecemeal information sharing. Since supply and demand conditions often change over time, the participating members need to assess the best practice of their collaborative enablers regularly. This necessity leads to the use of internal assessment of collaborative enablers and relating the assessment results to the performance gaps Simatupang & Sridharan, 2002a & 2002b).

3.3 Manufacturing and Service Supply Chain

This research is focusing on both aspects of supply chain; manufacturing and service supply chain. Basically, there are characteristic differences between these two areas as discuss below. It is important to highlight the differences between service supply chains and the more traditional manufacturing supply chains.

The key concepts from literature that has emerged the definition of Service Supply Chain (SSC) are (Cohen et al 2006, Srai 2007):

- SSC as a network of resources
- SSC as a service offering
- SSC as a customized solution

From this key element led to the development of a SSC definition (A.Iakovaki, J.S Srai, 2009):

"Service Supply Chain is a network of inter-connected organisations that utilizes resources and transforms their inputs (skills and knowledge) into the service offering to enhance the delivery of a flexible customize solution"

In service supply chains, human labour forms a significant component of the value delivery process and while, physical handling of a product leads to standardized and centralized procedures and controls in manufacturing supply chains, in services this is not entirely possible as many of the decisions are taken locally and the variation and uncertainties in outputs are higher because of the human involvement (Sengupta, Heiser, & Cook, 2006). In addition, the focus of efficiencies in service supply chains is on management of capacity, flexibility of resources, information flows, service performance and cash flow management. These issues are quite different from manufacturing supply chains and hence extensive examination of service supply chains is required to further understand these issues (Ellram, Tate and Billington 2004).

However, there are there are also many areas where there are similarities. For instance, demand management, customer relationship management and supplier relationship management are critical factors in manufacturing supply chains that remain equally important in service supply chains. For the conceptualization of a consulting service from a supply chain perspective, the consultancy can be perceived as "manufacturing" a service package that can be bought by a customer (and inventoried as the

consultancy's latent professional capacity). This is influenced by Ellram et al. (2004) who view a service as the transfer of capacity from a vendor to a client.

3.3.1 Differences between Manufacturing Supply Chain and Service Supply Chain

Ion Linton (2011) suggested that there are five main differences between service and manufacturing organisations: the tangibility of their output; production on demand or for inventory; customer-specific production; labor-intensive or automated operations; and the need for a physical production location. However, in practice, service and manufacturing organisations share many characteristics. Many manufacturers offer their own service operations and both require skilled people to create a profitable business.

Goods, "The key difference between service firms and manufacturers is the tangibility of their output. The output of a service firm, such as consultancy, training or maintenance, for example, is intangible. Manufacturers produce physical goods that customers can see and touch".

Inventory, "Service firms, unlike manufacturers, do not hold inventory; they create a service when a client requires it. Manufacturers produce goods for stock, with inventory levels aligned to forecasts of market demand. Some manufacturers maintain minimum stock levels, relying on the accuracy of demand forecasts and their production capacity to meet demand on a just-in-time basis. Inventory also represents a cost for a manufacturing organisation".

Customers, "Service firms do not produce a service unless a customer requires it, although they design and develop the scope and content of services in advance of any orders. Service firms generally produce a service tailored to customers' needs, such as 12 hours of consultancy, plus 14 hours of design and 10 hours of installation. Manufacturers can produce goods without a customer order or forecast of customer demand. However, producing goods that do not meet market needs is a poor strategy".

Labor, "A service firm recruits people with specific knowledge and skills in the service disciplines that it offers. Service delivery is labor intensive and cannot be easily automated, although knowledge management systems enable a degree of knowledge capture and sharing. Manufacturers can automate many of their production processes to reduce their labor requirements, although some manufacturing organisations are labor intensive, particularly in countries where labor costs are low."

Location, "Service firms do not require a physical production site. The people creating and delivering the service can be located anywhere. For example, global firms such as consultants Deloitte use communication networks to access the most appropriate service skills and knowledge from offices around the world. Manufacturers must have a physical location for their production and stock holding operations. Production does not necessarily take place on the manufacturer's own site; it can take place at any point in the supply chain".

In the context of this research, the Service Supply Chain involve was a consultancy service from professionals to develop a portal for SMEs across Europe countries. They supplied their expertise and information in order to achieve the aims of collaborative project.

Reflect back to the objectives of this research is to identify the impact of E-Collaboration Technology on efficiency and effectiveness of collaborative decision-making in Manufacturing and Service supply chain. Before the objective achieved by conducting the empirical work, it is important to understand and identify from the literature on what are the type of decisions involve in supply chain activity, that can be made collaboratively. This lead to answer the first research question in Section 3.4.

3.4 Decision-making in Supply Chain

Section 3.4 is an attempt to answer the Research Question 1.

3.4.1 Supply Chain and Levels of Decision-making

Supply chain management is typically viewed to lay between fully vertically integrated firms, where the entire material flow is owned by a single firm, and each channel

member operates independently. Therefore, coordination between the various players in the chain is key in its effective management. For a supply chain to work efficiently, all the different divisions of it must perform in harmony. The most important relation in this chain is among the adjacent departments, but for the whole chain to work effectively, it has to make a coordinated effort to achieve that goal.

There are two types of decisions that are relevant to supply chain management; strategic and operational. The strategic decisions are always made over a longer period of time, usually in years. These decisions are parallel to the corporate strategy and guide supply chain policies from a design perspective. The operational decisions are there to manage the product flow so that it is in conformance with the strategically planned supply chain (Ashok Sinha, 2009).

There are four major decision areas in supply chain management (Ashok Sinha, 2009):

Location, "The location is dependent on determination of customer satisfaction and the prevalent and predicted market demands for products or services. The location of facilities involves a commitment of resources to a long-term plan. Once the size, number and location of these are determined, so are the possible paths by which the product flows through to the final customer. These decisions are of great significance to a firm since they represent the basic strategy for accessing customer markets and will have a considerable impact on revenue, cost and level of service. Although location decisions are primarily strategic, they also have implications on an operational level."

Production, "Strategic decision on production focus on what customers want and the market demands. It takes into consideration on what and how many products to produce, and what parts or components should be produced at which plants or outsourced to capable suppliers. These decisions also focus on capacity, quality and volume of goods. These types of decisions have a big impact on the revenues, costs and customer service levels of the firm. Another critical issue is the capacity of the manufacturing facilities; and this largely depends the degree of vertical integration within the firm. Operational decisions focus on detailed production scheduling

including master production schedules, scheduling production on machines and equipment maintenance. Other considerations include workload balancing and quality control measures at a production facility."

Inventory, "These decisions refer to means by which inventories are managed. Inventories exist at every stage of the supply chain as either raw material, semi-finished or finished goods. They can also be in process between locations. Operational inventory decisions revolved around optimal levels of stock at each location to ensure customer satisfaction as the market demands fluctuate."

Transportation, "The mode choice aspects of these decisions are more to strategic ones. These are closely linked to the inventory decisions as well as meeting customer demands. Using air transport obviously gets the product out quicker and to the customer expediently, but the costs are high opposed to sea or rail. They may be much cheaper, but they necessitate holding relatively large amounts of inventory to buffer against the inherent uncertainty associated with them. Therefore, customer service levels and geographic location play vital roles in such decisions. Since transportation is more than 30% of the logistics costs, operating efficiently makes good economic sense."

In manufacturing supply chain, strategic decisions typically deal with market entry and mobilizing resources needed to meet market requirements over time (Muckstad et al., 2001). The operational level is concerned with the very short-term decisions made from day-to-day (Huin et al., 2002). Strategic logistics decisions concern major capital commitments and long time horizon including the location choices within a distribution networks or more basic make or buy decisions. Operational logistics decision-making relates to day-to-day operations and usually involve low capital investment (Becker et al,. 2004).

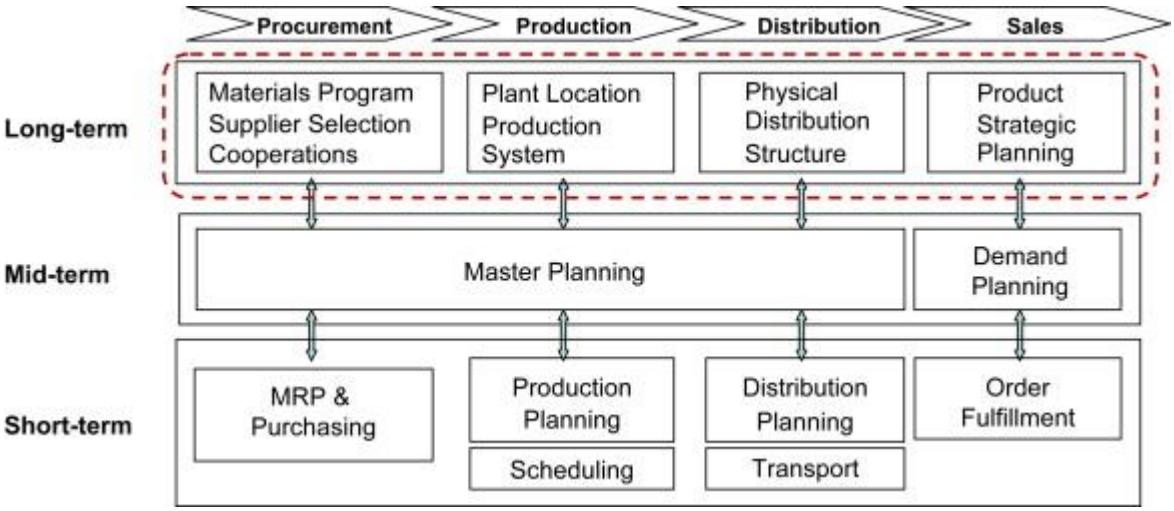


Figure 3.13 The Supply Chain Planning Matrix (adapted from Rohde et al., 2000)

Figure 3.13 shows typical tasks which occur in most supply chain types but with various contents in the particular supply chain arenas. The border between the tactical (Mid-term) and operational levels (Short-term) is vague (Laubacher et al., 1997) since the fulfilment of actual orders at operational level goes hand in hand with the tactical allocation of the resources needed at operational level. However, from researcher's point of view, the tactical level activities should be combined with the operational level since the tactical levels comprises of the day-to-day coordination and planning of the supply chain activities. In the operational levels organisations deal with the coordination of the operational planning of manufacturing, inventory management and transportation processes. Exchange of order and planning information allows the actors in the chain to jointly optimize their processes and inventory levels.

- **Strategic level -** At this level, company management will be looking to high level strategic decisions concerning the whole organisation, such as the size and location of manufacturing sites, partnerships with suppliers, products to be manufactured and sales markets.

- **Tactical level -** Tactical decisions focus on adopting measures that will produce cost benefits such as using industry best practices, developing a purchasing strategy with favoured suppliers, working with logistics companies to develop cost

effect transportation and developing warehouse strategies to reduce the cost of storing inventory.

- **Operational level -** Decisions at this level are made each day in businesses that affect how the products move along the supply chain. Operational decisions involve making schedule changes to production, purchasing agreements with suppliers, taking orders from customers and moving products in the warehouse.

Successful supply chain management requires many decisions relating to the flow of information, product, and funds. These decisions fall into three categories or phases, depending on the frequency of each decision and the time frame over which a decision phase has an impact as mentioned in (Chopra, 2004).

- **Supply chain strategy or design:** During this phase, a company decides how to structure the supply chain over the next several years. It decides what the chain's configuration will be, how resources will be allocated, and what processes each stage will perform. Strategic decisions made by companies include the location and capacities of production and warehouse facilities, the products to be manufactured or stored at various locations, the modes of transportation to be made available along different shipping legs, and the type of information system to be utilized. A firm must ensure that the supply chain configuration supports its strategic objectives during this phase. Dell's decisions regarding the location and capacity of its manufacturing facilities, warehouses, and supply courses are all supply chain design or strategic decisions. Supply chain design decisions are typically made for the long term (a matter of years) and are very expensive to alter on short notice. Consequently, when companies make these decisions, they must take into account uncertainty in anticipated market conditions over the next few years.
- **Supply chain planning:** For decisions made during this phase, the time frame considered is a quarter to a year. Therefore, the supply chain's configuration determined in the strategic phase is fixed. The configuration establishes constraints within which planning must be done. Companies start the planning phase with a forecast for the coming year (or a comparable time frame) of demand in different

markets. Planning includes decisions regarding which markets will be supplied from which locations, the subcontracting of manufacturing, the inventory policies to be followed, and the timing and size of marketing promotions. Planning establishes parameters within which a supply chain will function over a specified period of time. In the planning phase, companies must include uncertainty in demand, exchange rates, and competition over this time horizon in their decisions. Given a shorter time horizon and better forecasts than the design phase, companies in the planning phase try to incorporate any flexibility built into the supply chain in the design phase and exploit it to optimize performance. As a result of the planning phase, companies define a set of operating policies that govern short-term operations.

- **Supply chain operation:** The time horizon here is weekly or daily, and during this phase companies make decisions regarding individual customer orders. At the operational level, supply chain configuration is considered fixed and planning policies are already defined. The goal of supply chain operations is to handle incoming customer orders in the best possible manner. During this phase, firms allocate inventory or production to individual orders, set a date that an order is to be filled, generate pick lists at a warehouse, allocate an order to a particular shipping mode and shipment, set delivery schedules of trucks, and place replenishment orders. Because operational decisions are being made in the short term (minutes, hours, or days), there is less uncertainty about demand information. Given the constraints established by the configuration and planning policies, the goal during the operation phase is to exploit the reduction of uncertainty and optimize performance.

In summary, the design, planning, and operation of a supply chain have a strong impact on overall profitability and success. Those decisions have its own characteristic and the key decision-maker who responsible to do decision-making need to consider the nature and background of the decision itself.

3.5 Literature Discussion and Conceptual Framework Development

In the Chapter 2 and the previous sections in Chapter 3, the researcher reviewed the main body of literature underpinned this research. These include concepts in E-Collaboration Technologies, supply chain collaboration, concept of trust as well as management decision-making. Table 3.2 explains the summary of interrelations between the different components over each other were examined; based on the literature that had been reviewed.

The interrelations of the components also led to the development of the conceptual framework which further developed the Contextual Factors and Social Factors into the main elements of the attributes to be analysed.

Table 3.3 Interrelation between each research components.

	Supply Chain Collaboration (Manufacturing & Service)	E-Collaboration Technologies	Collaborative decision-making	Trust	Style of Decision-making	Group Task Types
Supply Chain Collaboration (Manufacturing & Service)	NA	The impact of fostering supply chain collaboration by means of electronic tools provides plentiful evidence of the benefits of electronic integrations (Berry, 2011; Wang, 2006)	Supply chain collaboration allows joint information sharing and decision-making (Mentzer et al., 2000; Anthony, 2000)	Effective of coordination of the supply chain collaboration requires a degree of trust between all players (Nesheim, 2001; Barrat, 2001)	The Circumplex Model of Group Task Types	
E-Collaboration Technologies	Online technologies have significantly improved collaboration and integration among supply chain partners (Sanders, 2007; Feeny, 2001)	NA	E-Collaboration Technologies enable organizations to implement complex decisions in a timely manner (Bidgoli, 2012; Kock, 2005)	Online communication able to increase risk, trust helps to reduce the complexity (Lahno, 2002)		
Collaborative decision-making	There are two type of decisions that are relevant to supply chain management; strategic and operational (Ashok, 2009; Chopra 2004)	There are different impacts when making decision through computer mediated communication and face-to-face (Strauss & McGrath, 1994; Hedlund et al., 1998)	NA	Inter-personal and inter-organizational trust are two important attributes to collaborative decision-making (Zaheer et al, 2008)		
Trust	Trust as an influential variable in supply chain collaboration has been particularly recognize in operations management literature (Johnston et al., 2004; Ireland & Webb, 2007; McCutcheon & Stuart, 2000)	Many users of advance communication technologies state that they find it hard to develop trust with someone they cannot see face-to-face (Mitra, 2002; Doring, 1998)	Trust helps to reduce the complexity of decision-making (Luhmann, 1979; Adam & Sasse, 2001; Lahno, 2002)	NA		

In conclusion of Table 3.3, the previous sections highlighted the relationship between each research component that led to the development of the conceptual framework. It argues that each research component has a prime or appropriate level of collaboration, specifically in terms of decision-making activities. This discussion was based on the previous studies led to the development of the conceptual framework shown in Figure 3.14.

3.6 The Conceptual Framework

To demonstrate the key element that become the backbone to find the answer of the research questions, the researcher develop the first stage of conceptual framework that will be updated after empirical work has been done. Figure 3.12 presents the conceptual framework that underpin this research based on the previous studies that led to the development of the conceptual framework.

The conceptual framework containing two main components that has been separated in red dash line and blue dash line.

The components in red dash line represent the elements that will be analysed and will become the main findings of this research; on how E-Collaboration Technologies give impacts towards efficiency and effectiveness on collaborative decision-making with relation to decision-making styles and the task types. Those elements has been discussed in depth in this chapter.

The blue dash line represents the contextual factors and social factors that has been identified in the review of literature and has been discussed in Chapter 2. Those factors are important to identify the impact of E-Collaboration Technologies towards efficiency, effectiveness and trust development in collaborative decision-making in Service Supply Chain and Manufacturing Supply Chain.

The updated conceptual framework will be present in Chapter 7 based on the findings from analysis of the cases.

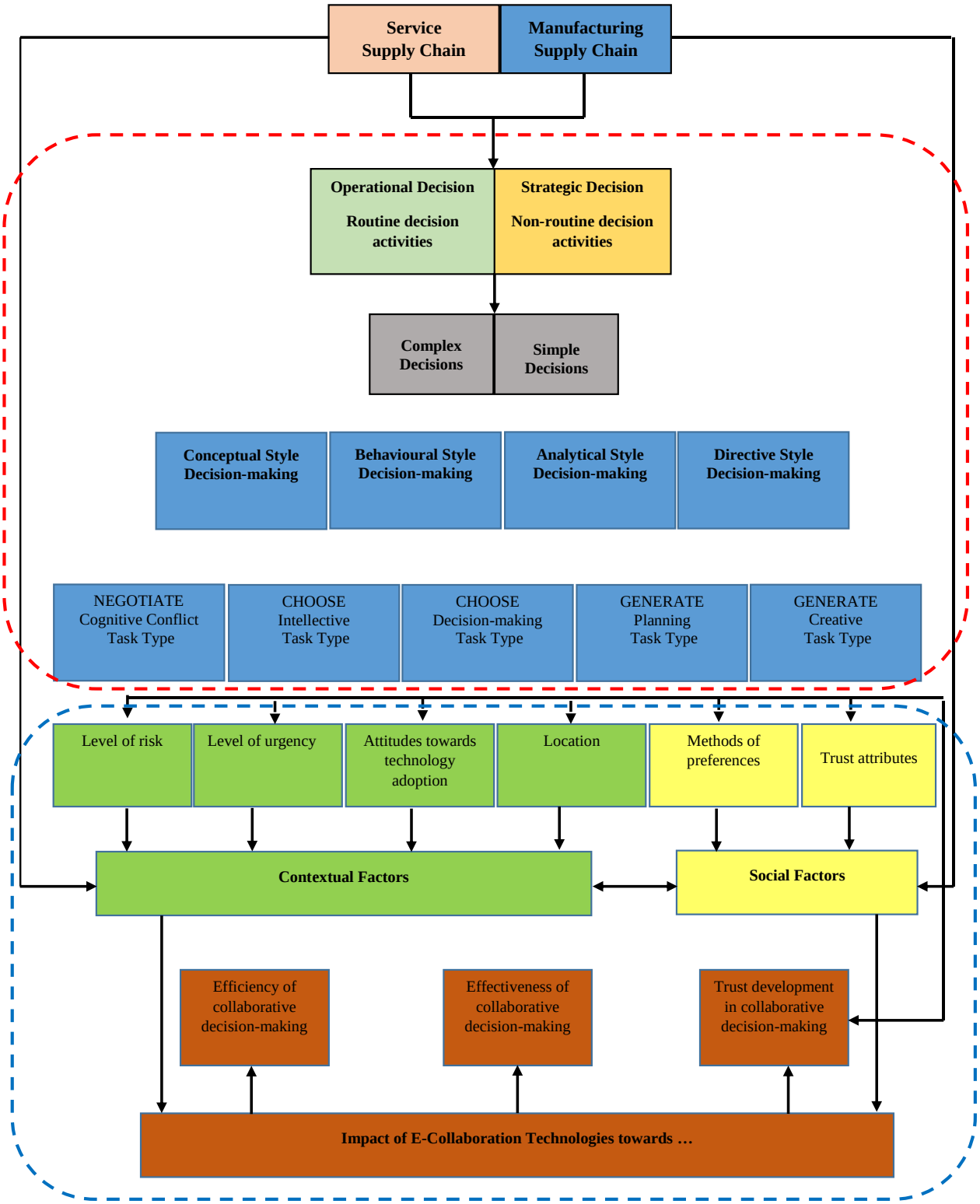


Figure 3.14 The Conceptual Framework (high level)

3.6.1 Contextual Factors

There are four components of contextual factors analysed in this research; containing levels of risk, level of urgency, attitudes towards technology adoption and location. These are the factors that influence the concerns among decision-makers in adopting E-Collaboration Technologies in their collaborative decision-making. The influence of the contextual factors will impact the efficiency, effectiveness and trust development in collaborative decision-making.

3.6.2 Social Factors

Methods of preferences and trust attributes are the key social factors that impact the adoption of E-Collaboration Technologies in the decision-making process. Social factors are external aspects that may influence the decision-makers attitudes, whether the E-Collaboration Technologies able to give a positive / negative impact or negligible impact towards their collaborative decision-making process.

3.7 Discussion and Conclusion

Building on the previous theoretical discussion in this chapter, it was deemed important to summarize the research questions, deduced from the literature review, for data interpretation that will be addressed in the following chapters through empirical inquiry:

RQ 1: What are the types of collaborative decisions that are made in Supply Chain?

This research questions has been answered in Chapter 3 – Section 3.4. In order to identify the other factors related to the decision-making efficiency and effectiveness, it is deemed important to know the background of the decisions involve in supply chain activities.

As a summary, basically there are four major decisions that has been made in supply chain management (Ganeshan, 2002). They are location, production, inventory and transportation. However, as the process in supply chain expanding, there are a lot of

other aspects that need to be considered and become the manager's responsibility to do decision-making, whether in strategic, tactical or operational level as discussed in Huin et al., (2002), Muckstad et al., (2001) and Becker et al., (2004). At strategic level, the key decision-makers will involve in long term and high level decisions that concerning the whole organisation in every aspects. This decision is a non-routine decision category. While in tactical level, they are focusing mainly on how to gain cost benefits in supply chain activities. These includes industry best practices, purchase strategy, relationship with customers and suppliers as well as in logistic and transportations. In operational level, it involves routine decisions that is made in daily basis. This include decisions in productions area, order and purchase, moving products in the warehouse and other daily activities involving customers and suppliers.

In supply chain management, the flow of information, product and funds area requires many decisions to be made. These decisions involve in three phases or categories, depending on the frequency of each decisions and the importance of the decisions (Chopra, 2004). The first phase is supply chain strategy or design. During this phase a company decides and do planning to structure the supply chain process and activities for a long term run. Mostly it involves strategic level and to ensure the supply chain configuration supports it strategic objectives during this phase. Consequently, when companies make decisions, they must aware about the risk and uncertainty of the market conditions over the next few years. The second phase is supply chain planning, which the time frame considered is for quarter to a year. The configuration establishes constraints within which planning must be done first. Planning includes decisions regarding markets supplied, subcontracting, inventory, policies to be followed etc. during the third phase which is supply chain operation, it involves operational level where the time horizon is daily or weekly. During this phase, companies make decisions regarding individual customer orders. The goal of supply chain operations is to handle incoming customer orders in the best possible way. From the constraints established by the first and the second phase, the supply chain operation phase is to exploit the reduction of uncertainty and optimize performance.

RQ 2: How does E-Collaboration Technology enable collaborative decision-making in Service Supply Chain and Manufacturing Supply Chain?

This research is examining two aspects of supply chain; service and manufacturing. In order to identify the impact of medium of communication towards efficiency and effectiveness of collaborative decision-making in these two areas, empirical work has been done using qualitative methods that will be discussed in the next chapter. Answer to RQ 2 will be presented in Chapter 7.

RQ 3: How can E-Collaboration Technologies gives Positive or Negligible (low) impact in inter-organisational trust development for Service Supply Chain and Manufacturing Supply Chain context?

This research question aim to identify on how adoption of E-Collaboration Technologies are able to give a Positive or Negligible impact in inter-organisational trust development in service supply chain and manufacturing supply chain. The answer for RQ 3 will be presented in Chapter 7.

The research questions defined above will provide guidance for data gathering as well as interpretation of data in the empirical chapters of this thesis. The next chapters will discuss the research method and design that become the guidance in the research process.

CHAPTER 4

RESEARCH METHODOLOGY

Research methodology has a central role in any kind management research if the research aims to demonstrate credibility. A lack of consideration of the philosophical nature of the research might seriously affect the quality of the research's outcome. The way the researchers understand and interpret the reality of the world will influence the research process followed and in consequence the results and findings. Hence, the philosophical assumptions will help the researcher to choose the right research strategies, techniques and designs. There are some benefits of understanding various research approaches highlighted by (Easterby-Smith et al., 2004):

- Design process of the research is clearer.
- Understanding the characteristics of the different philosophical paradigms may help the researcher to foresee which research design may work and which may not.
- It may help the researcher to identify and create research designs that might be unknown for him/her.
- Helps the researcher to develop a *research identity*.

4.1 Research Philosophy

Another issue that is much worthy to consider while discussing methodology is the philosophical issues that is related to the research. Philosophy is primarily concerned with rigorously establishing, regulating and improving the methods of knowledge creation in all fields of intellectual endeavor, including the field of management research. Easterby-Smith et al (2008) discussed how philosophical factors could affect the overall arrangements, which enable satisfactory outcomes from a research activity. In the pace of producing high quality research, Easterby-Smith et al (2008) identified three reasons for the usefulness of understanding philosophical issues in research:

- It can help to clarify research designs. This not only involves considering what kind of evidence is required and how it is to be gathered and interpreted, but also how this will provide good answers to the basic research questions being investigated in the research.
- It can help the researcher to recognize which designs will work and which will not.
- It can help the researcher identify, and even create, designs that may be outside his past experience. And it may also suggest how to adapt research designs according to the constraints of different subjects or knowledge structures.

4.2 Research Paradigms

A paradigm can be defined as the "basic belief system or world view that guides the investigation" (Krauss, 2005). Hussi and Hussi (1997) referred to paradigms as a framework comprising an accepted set of theories, methods and ways of defining data. Paradigms could be identified as the philosophical positions through which management research is carried out. It is unwise to conduct research without an awareness of the philosophical and political issues that lie in the background. The decision to study a topic in a particular way always involve some kind of philosophical choice about what is important (Easterby-Smith et al, 2008).

A paradigm is a construct that specifies a general set of philosophical assumptions covering, ontology (what is assumed to exist), epistemology (the nature of valid knowledge), methodology and methods (Mingers, 2003). Table 4.1 provides description to the meaning of the different philosophical constituents (ontology, epistemology, methodology and methods).

Table 4.1 Philosophical constituents (Easterby-Smith et al, 2008)

Ontology, epistemology, methodology and methods	
Ontology	Assumptions that we make about the nature of reality
Epistemology	General set of assumptions about the best ways of inquiring into the nature of the world
Methodology	Combination of techniques used to inquire into specific situation
Methods	Individual techniques for data collection, analysis, etc.

A theoretical paradigm is thus the identification of the underlying basis that is used to construct a scientific investigation; or, "a loose collection of logically held together assumptions, concepts, and propositions that guides thinking and research" (Krauss, 2005). It could be identified that different paradigms represent different viewpoints of the nature of reality, how to inquire into that reality and the suitable methods and techniques to do so. Every researcher brings to his/her research a set of interlocking philosophical assumptions and stances (Rocco et al, 2003). Hence, it is important to recognize and understand your personal paradigm as this will guide the entire course of the research project (Hussi and Hussi, 1997).

A paradigm indicates the researcher perception about how social science research should be conducted. As a general guide, Easterby-Smith et al (2008) identified three different philosophical traditions/paradigms; positivism, realism and social constructionism. These paradigms could be seen as a continuum with two contrasting views; positivism and social constructionism taking the two different ends of the scale. It should be noted that the methodology literature identified different terminologies while referring to these two contrasting philosophical paradigms. Some authors distinguished between Positivism and Phenomenological paradigms while others referred to qualitative and quantitative paradigms.

Positivism and social constructionism positions have to some extent been elevated into a stereotype, often by the opposing side (Easterby-Smith et al, 2008). These paradigms exhibit different views regarding truth; whether it is out there waiting to be discovered or it is constructed within the minds of the individuals and between people in a culture. The following section will cover the three different paradigms in more details.

4.2.1 Positivist Paradigm

The positivist paradigm proposes that the social world exists externally, and that its properties should be measured through objective methods, rather than being inferred subjectively through sensation, reflection or intuition (Easterby-smith et al, 2008). Reality in a positivist paradigm is assumed to be objective and singular and exists outside our perception (Hussi and Hussi, 1997). Positivists believe that facts exist independently of any theories or human observation and that truth is definite and ascertainable. Scientists conduct empirical experiments in laboratories and report what they have discovered as experts.

Briefly, positivist epistemology has the following characteristics (Easterby-Smith et al., 2004; Scholarios, 2005):

- Independence - the observer is independent of what is being observed
- Value-free and scientific - the choice of subject and method can be made objectively, not based on beliefs or interests
- Hypothetico-deductive - hypothesize a law and deduct what kinds of observations will demonstrate its truth or falsity
- Large samples
- Empirical operationalisation - typically quantitative
- Principles of probability
- Reductionism - break problems down into their smallest elements
- Generalisation - sufficient samples should be selected in order to generalise to a population

It is a position that holds that the goal of knowledge is simply to describe the phenomena that we experience. The purpose of science is simply to stick to what we can observe and measure. Knowledge of anything beyond that, a positivist would hold, is impossible (Krauss, 2005).

4.2.2 Interpretivist Paradigm

Interpretivist approach generally takes an '*open minded'* approach and starts from data rather than a literature based theory or hypotheses to be tested out. Interpretivist researchers look at organisations in depth and generally appoint to extensive conversations, observations and secondary data analysis such as company documents and reports in order to overcome generalisability critiques (Easterby-Smith et al., 2004:40).

However, interpretivist researchers engage with a deeper understanding of meanings in data analysis rather than aiming to generalize things. Interpretivist paradigm intends to deal with different contexts through sense making rather than objective real world out there. Interpretivist researchers generally employ methods such as ethnography, phenomenology, hermeneutics and discourse analysis in order to generate qualitative data. Data analysis involves observations, depth interviewing and analysis of text (Beech, 2005). Table 4.2 provides a summary for the main differences between the positivist and interpretivist paradigms.

Table 4.2. Contrasting implications of positivism and interpretivist (Easterby-Smith et al., 2008)

	Positivism	**Interpretivist**
The observer	Must be independent	Is part of what is being observed
Human interests	Should be irrelevant	Are the main drivers of science
Explanation	Must demonstrate causality	Aims to increase the general understanding of the situation
Research progress through	Hypothesis and deduction	Gathering rich data from which ideas are induced
Concepts	Need to be operationalized so that they can be measured	Should incorporate stakeholder perspectives
Units of analysis	Should be reduced to simplest form	May include the complexity of the whole situation
Generalization through	Statistical probability	Theoretical abstraction
Sampling requires	Large numbers selected randomly	Small number of cases chosen for specific reason

4.2.3 Critical Realism Paradigm

The philosophical debate around pure positivism and pure interpretivism is very distinctive, however, in practice to follow those pure paradigms are not always possible in social scientific research. Although management researchers are more passionate at the beginning into pursuing a particular philosophy, when they are conducting the field work they might be using different research designs at their convenience.

Critical realist paradigm can be seen as useful compromise which can combine the strengths and avoid the limitations of positivist and interpretivist paradigms although it has its own strengths and weaknesses too. The major strong points are it recognizes the value of using multiple sources of data and perspectives and the weak point is large samples might be required which might be costly (Easterby-Smith et al., 2004: 42). Table 4.3 summarizes the main distinctions seen in positivist, interpretivist and critical realist paradigms regarding the interpretation of the nature of truth and their general approach to conducting management research. There seems to be a stronger polarization between pure positivist and pure interpretivist epistemologies whereas critical realist epistemology appears to be taking a middle view.

Table 4.3. Strengths and weaknesses in the three main paradigms (Adapted from Easterby-Smith et al, 2008)

	Strengths	**Weaknesses**
Positivist	Can provide wide coverage. Potentially fast and economical. Easier to provide justification to policies.	Inflexible and artificial. Not good for processes, meaning or theory generation. Implication for actions not obvious.
Critical realism	Accept value of multiple data sources. Enables generalization beyond present sample. Greater efficiency including outsourcing potential.	Requires large samples. Cannot accommodate institutional and cultural differences. Problems reconciling discrepant information.
Interpretivist	Good for processes, and meanings. Flexible and good for theory generation. Data collection less artificial.	Can be very time consuming. Analysis and interpretations are difficult. May not have credibility with policy makers.

Although it is now possible to draw up comprehensive lists of assumptions and methodological implications associated with each position, it is not possible to identify any philosopher who ascribes to all aspects of one particular view. There are many management researchers adopt a pragmatic view by deliberately combining methods drawn from both traditions. (Easterby-Smith et al, 2008).

4.3 Research Paradigms Constituents

As mentioned earlier each paradigm has its own ontological beliefs, epistemology, methodology and preferred methods. To identify the appropriate research strategy to tackle a research questions or propositions, researchers have to specify the ontological and epistemological orientations, the methodology and in turn the suitable method or technique. These choices represent the building blocks for any research strategy as shown in Figure 4.1.

Figure 4.1 Research strategy design building blocks (Adapted from Beech, 2005)

4.3.1 Ontology

Ontology is related to the nature of truth in world. This can be subjective or objective and thus explained as "assumptions that we make the nature of reality" (Easterby-Smith et al., 2004: 31). Science and social science debates around ontology have been different from each other. Social science does not follow a traditional approach and therefore richer in philosophical debates. Main ontologies are (Easterby-Smith et al., 2004; Scholarios, 2005):

- *Objective* ontology (physical sciences approach; deals with facts, causality, fundamental laws, reductionism, measurement and objective reality; the truth holds regardless of who the observer is; aim is to discover what is there).
- *Subjective* ontology (constructed; the nature of what is there is not solid but shifting; truth depends on who establishes it and facts are all human creations; aim is to understand people's interpretations and perceptions).

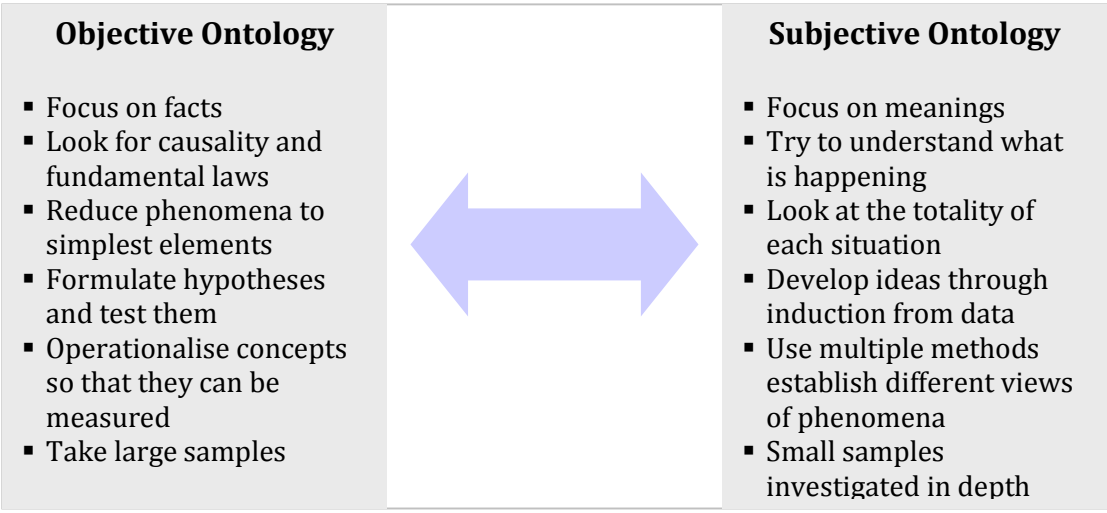


Figure 4.2 Objective VS Subjective Ontology (Beech, 2005)

4.3.2 Epistemology

Epistemology is the study of the criteria by which we can now what does, and does not constitute scientific knowledge (Johnson and Cassell, 2001). It is concerned with the study of knowledge and what we accept as being valid knowledge (Hussi and Hussi, 1997). Krauss (2005) identified that epistemology poses the following questions: What is the relationship between the knower and what is known? How do we know what we know? What counts as knowledge? Similar to ontological choices, epistemological choices ranges from positivism to interpretivism or social constructionism. Epistemological decisions are around the assumptions that must be made concerning the conceptual procedures by which knowledge of the social may be gained as shown in Table 4.4.

Table 4.4 Different assumptions for epistemological choices (Adapted from Easterby-Smith et al, 2008).

Social Science epistemologies			
	Positivism	**Critical realism**	**Social constructionism**
Aim	Discovery	Exposure	Invention
Starting point	Hypothesis	Suppositions/questions	Meanings
Designs	Experiment	Triangulation	Reflexivity
Techniques	Measurement	Survey	Conversation
Analysis/interpretation	Verification/ falsification	Probability	Sense-making
Outcomes	Causality	Correlation	Understanding

4.4 Methodology

Methodology refers to whether the research is following a deductive or inductive approach. Inductive and deductive research refers to the starting point of the research journey.

- **Inductive** is the process by which theory is generated (Buckley et al., 1976). While Charreire and Durieux (2001) addressed that induction, in logic, usually means to assert the truth of general proposition by considering particular cases that support it. Inductive research works moving from specific observations to broader generalization and theories. Inductive research starting with specific observations, begin to detect patterns and regularities, formulate some tentative hypotheses that can be explored, and finally end up developing some general conclusions or theories.

- **Deductive** approach starts with literature followed by empirical investigation. It is the process by which theory is tested (Buckley et al., 1976). Deduction by definition is characterized by the fact that, if hypotheses formulated initially are true, then conclusions that follow logically from these premises must necessarily be true (Charreire and Durieux, 2001). Deductive research works

from more general to the more specific. Starting with thinking up a theory about a topic of interest, then narrow that down into more specific hypotheses that can be tested.

Methodology also is concerned by whether the aim is to build a theory or test existing theories. Building theory refers to research where the aim is to establish a theory and tests it empirically, modifies the theory till reaching its final form. Theory testing methodology refers to the researches that aim to test an existing theory and verify its validity empirically.

4.5 Methods / Techniques

Methods are individual techniques for data collection, analysis, etc. (Easterby-Smith et al., 2004:31). When researchers decide to pursue a specific epistemology, they often adopt methods, which are commonly used within that epistemology. Techniques and methods are about what practices of research should be undertaken and the approach the researcher takes will impact on what he or she can see and find. Some research methods and techniques are statistical testing, experimental, secondary data analysis, case study, observation, interviews and participation.

The following section will discuss briefly some of the available methods/techniques that are available to management researchers. However, the purpose is not giving a detailed discussion around all these methods but rather highlighting the main features and characteristics of each methods.

4.5.1 Experimental Research

Classical experimental methods involve an attempt by the researcher to maintain control over the factors that may affect the result of an experiment. It involves random assignment of subjects to an experimental and control group. Conditions for the experimental group are then manipulated by the experimental/researcher; only the experimental sample is exposed to the manipulated variable in order to assess their effect in comparison with members of the control group who are receiving no unusual conditions. The researcher then compares the pretest results with the post-test results

for both samples. Any divergence between the two samples is assumed to a result of the experiment (Kalof et al, 2008).

In study of social and human life, experiments are quite popular among psychologists. In management studies, they are very much hard to conduct experiments within real organizations as it is rarely possible to conduct true experiments with randomization.

4.5.2 Quasi-Experimental Method

The term experiment usually implies a controlled experiment, but sometimes controlled experiments are prohibitively difficult or impossible. In this case the researcher may resort to quasi experiments. Quasi experiments rely solely on observations of the variables of the system understudy, rather than manipulation of just one or a few variables as occurs in controlled experiments. Individuals in quasi experiments are not allocated randomly to the treatment group and the control group, but rather allocation takes place on some other criterion, usually by using intact groups (Kalof et al, 2008).

One of the most common methods used is the pre-test/post-test comparison design. In this design, the effect of a certain intervention on a group might be evaluated before and after the intervention and by comparing the differences with those of a similar group who were not affected by the intervention but are evaluated with the same way at the same time as the first group.

4.5.3 Survey Method

Survey research involves the collection of information from individuals about themselves or about the social units to which they belong. The survey sample process determines information about large populations with a known level of accuracy. Researchers often distinguish between exploratory, confirmatory (theory testing) and descriptive survey research (Forza, 2002).

Exploratory survey research takes place during the early stage of a research phenomenon. Confirmatory survey takes place when knowledge of a phenomenon has been articulated in a theoretical form using well defined concepts, models and

propositions. Descriptive survey research is aimed at understanding the relevance of a certain phenomenon and describing the distribution of the phenomenon in a population (Forza, 2002). Generally, Yin (2003) identified that survey research is appropriate when the researcher has a high control over situation and when the research aims to answer a who, what, where, how many or how much questions.

4.5.4 Action Research

Action research assumes that social phenomena are continually changing rather than static (Huxham and Vangan, 2003). With action research, the researchers are often part of this process change itself. The following two beliefs are normally associated with action research designs (Eden and Huxham, 2002):

- The best way of learning about an organization or social system is through attempting to change it, and this therefore should be an objective of the action researcher.
- The people most likely to be affected by, or involved in implementing, these changes should as far as possible become involved in the research process itself.

4.5.5 Cooperative Enquiry

As identified by Oates (2002), cooperative inquiry has been developed for researching human action mainly at individual and community, rather than organizational levels. It starts with the idea that all people have, at least latently, the ability to be self-directing, to choose how they will act and to give meaning to their own experiences. It rejects traditional positivist methods where people are studied as if they were objects under the influence of external forces. Cooperative inquiry not only focuses on the experiences and explanations of the individuals concerned, it also involves them in deciding in the first place what questions and issues are worth researching. Thus the subjects become partners in the research process.

4.5.6 Case Study Research

Case study as a research strategy is defined as an empirical inquiry that investigates a phenomenon within organizational settings. Yin (2003) identified case study research as an empirical inquiry that investigates a contemporary phenomenon within its real-life context especially when the boundaries between the phenomenon and context are not clearly evident.

In other words, you would use the case study method because you deliberately wanted to cover contextual conditions, believing that they might be highly pertinent to your phenomenon of study. Case study method allows researchers to keep the holistic and significant characteristics of real-life events. It is an in-depth investigation/study of a single individual, group, incident or community. Case research provides a systematic way of looking at events, collecting data, analyzing information, and reporting the findings (Yin, 2003). As a result, the researcher may gain a sharpened understanding of why the instance happened as it did, and what might become important to look at more extensively in future research.

Case study research comprises single and multiple case studies, can include both qualitative and quantitative evidence, relies on multiple sources of evidence and benefits from the prior development of theoretical propositions.

Yin (1994) defined relevance as the extent to which the organization selected for the case study suits the purpose of the study. In looking for a suitable organization for the case study, the relevance of what is to be studied was dependent in part upon the collaborative decision-making context within the organization as the outset.

Besides, this research is raising a how and what questions. Yin (2003) identified that case studies are the preferred strategy when how or why questions are being posed, when the investigator has little control over events and when the focus is on a contemporary phenomenon within some real-life context. In the same vein, Voss et al (2002) identified that case study research has been recognized as being particularly good for examining the how and why questions.

The importance of case study research stems from both being good at investigating how and why questions as well as being particularly suitable for developing new theories and ideas (Voss et al, 2002). Case research is widely used in several management disciplines, notably organizational behavior and strategy (Voss et al, 2002). Meredith (1989) cites three outstanding strengths of case research put forward by Voss et al (2002):

- The phenomena can be studied in its natural setting and meaningful, relevant theory generated from the understanding gained through observing actual practice.
- The case method allows the questions of why, what and how, to be answered with a relatively full understanding of the nature and complexity of the complete phenomena.
- The case method lends itself to early, exploratory investigations where the variables are still unknown and the phenomenon not at all understood.

Case studies are rich, empirical descriptions of particular instances of a phenomenon that are typically based on a variety of data sources (Eisenhardt and Graebner, 2007). The central notion is to use cases as the bases from which to develop theories. The theory is emergent in the sense that it is situated in and developed by recognizing patterns of relationships among constructs within and across cases and their underlying logical arguments (Eisenhardt and Graebner, 2007).

4.6 Research Design

Research design is about selecting the most appropriate strategy to tackle the research questions and consequently provide valid answers to the research questions. Selecting the appropriate research strategy requires understanding the nature of the research, research questions, aim of the research, and the researcher philosophical orientation. Figure 4.3 highlights the key decisions that the researcher took to identify the appropriate research strategy.

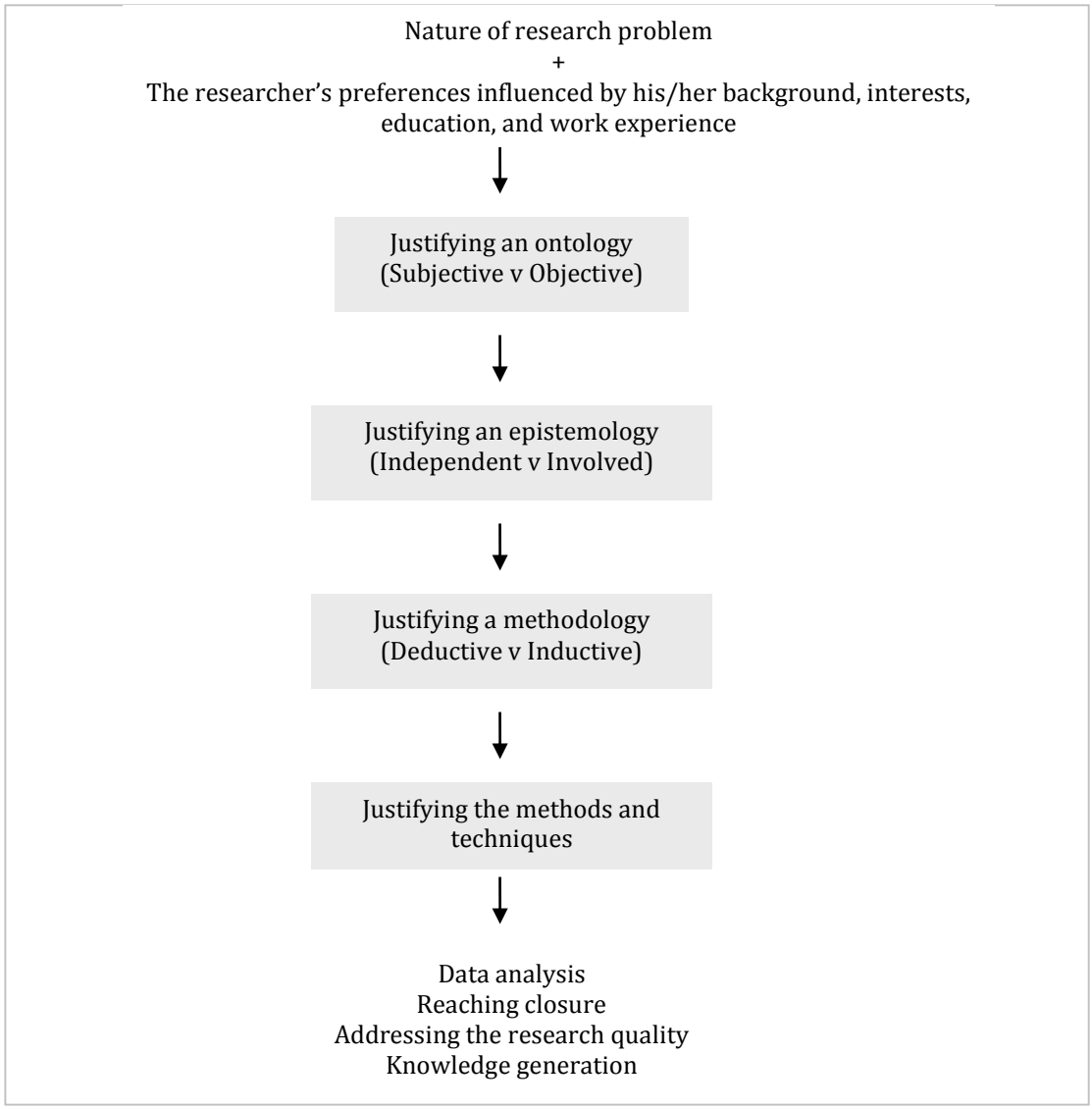


Figure 4.3. Research design activity map (adapted from Beech, 2005)

4.6.1 Philosophical Choice

The second determinant for selecting appropriate research strategy is the philosophical orientation. Philosophical choices of research involve choices regarding the ontological and epistemological orientation of the research. Easterby-Smith et al., (2008) highlighted the importance of these philosophical issues and identified that failure to think through these issues, such as the relation between data and theory, while not necessarily fatal, can seriously affect the quality of management research.

4.6.2 Ontological Choice

Basically, the philosophical assumptions from the researcher point of view fall under ***subjectivist ontology***. Ontology is concerned with nature of reality. It is the assumptions that the researcher have about the way the world operates and the commitment held to particular view. The researcher believe that the world is socially constructed and subjective. The researcher feel more comfortable in the frame of mind that social world should be looked at more subjectively rather than just focus and rely on the fact. The researcher is looking at the technological aspect and as known, communication technologies are growing and inventing fast based on what people think it is appropriate to be developed. From the perspective of decision-making, understanding management behaviour is vital in order to identify the strategy taken on making decision for the organization. At this point, fact itself cannot be reliable as the researcher think it should be looked in depth and problem analysis should be managed by considering the totality of the each situation.

As a subjectivist, the researcher put herself as part of what she observed and try to understand what is happening in both areas; the emerging E-Collaboration Technologies that will help collaborative decision-making and type and pattern of decision made by the managers and those areas should be coexisted and related. The preferred ontology for this research; subjective was done by recognising some parameters identified by Hussey and Hussey (1997). He mentioned that subjective ontology tends to produce qualitative data and this would suit well with the case study approach which will explain in the next paragraph. Moreover, the data is rich and subjective; the qualitative data would be rich by nature, and the gathering process would be subjective due to the level of involvement of the researcher.

4.6.3 Epistemology Choice

The researcher see her research taking more of an *interpretivist paradigm*. Within the information systems research arena writers such as Walsham (1993; 1995) take a strong stance on the interpretive view as the most useful paradigm. According to Clarke (2000) the interpretism defined as “Confronts the difficulties presented by the nature of the research domain such as the intangibility of many of the factors and

relationships; the inherent involvement of the researcher within the research domain; the dependence of outcomes on the researcher's perspective such as the definition of the research question, the design of the research question and the measurement of variables". Obviously, Clarke's concern with the measurement of variables which particular pertinent to information and people-based research. The goal of the interpretive view on this research is about sharing the perspective of the groups on how can communication technologies in E-Collaboration impact collaborative decision-making in supply chain to achieve efficiency and effectiveness. This is the method that allows natural behaviour for finding information and at the same time guides the researcher to make key decisions about information needs, information satisfaction and information fulfilment.

4.6.4 Methodology Choice

The research direction followed the ***inductive methodology*** rather than deductive methodology. Firstly because the researcher worked with a close understanding of the research context and aimed qualitative data collection. Moreover, induction approach is more flexible to permit changes of research emphasis as the research progresses. The choice of ontology and epistemology usually reflects the choice of methods used in the research. Figure 4.4 summarizes the research design map proposed by Beech (2005) that link ontological, epistemological and methodological research stance with the preferred techniques to provide valid answers to the research questions.

4.7 Research Technique Choice

The choice of ontology and epistemology usually reflects the choice of methods used in the research. As the researcher preferred to use subjective ontology, an interpretive epistemology and inductive methodology, the most appropriate research methods or technique for my research is a ***case study method***.

The case study as a research design method has been explored by a number of authors (Cavaye, 1996; Darke et al., 1998; Gillham, 2000; Jensen and Rodgers, 2001; Perry, 2001; Welman and Kruger, 1999; Yin, 1994). Yin (1994) for example defined a case study as "an empirical inquiry that investigates a contemporary phenomenon within

its real-life context". The execution of this research method was from the guidelines supplied by Myers (1997) who suggested the case study method will involve at least four stages of work:

1. Determining the present situation; in this research it was achieved through the study of current emerging E-Collaboration Technologies which will give impact on efficiency, effectiveness and trust development of collaborative decision-making process.

2. Gathering information about background to the present situation; this was achieved by doing literature reading and case study reading about E-Collaboration Technologies, management and supply chain decision-making and types of decision managers tend to make collaboratively.

3. Gathering more specific data; in this study it was achieved through in-depth exploration by the use of in-depth interview method.

4. Present an analysis findings and recommendations for actions; it was achieved through the feedback provided on an interim and final base to the case study organization as well as through the final research report.

Referring to Beech (2005) research design map, it could be identified that case study research among other methods (e.g. survey method) are deemed to be valuable potential strategies to tackle the research questions. This research could be classified as an exploratory theory building research. Voss, et al (2002) identified that case research has consistently been one of the most powerful research methods in operations management, particularly in the development of new theory. A case study is a history of a past or current phenomenon, drawn from multiple sources of evidence. It can include data from direct observation and systematic interviewing as well as from public and private archives. In fact, any fact relevant to the stream of events describing the phenomenon is a potential datum in a case study, since context is important (Voss et al, 2002).

This research aims to investigate and identify *how* the impact of E-Collaboration Technologies able to assist or become a barrier in collaborative decision-making. It also to explore *how* inter-organization trust development able to be achieved while E-Collaboration Technologies become the method of communication between collaborated partners. Yin (2003) identified that case studies are the preferred strategy when how or why questions are being posed, when the investigator has little control over events and when the focus is on a contemporary phenomenon within some real-life context. The importance of case study research stems from both being good at investigating how and why questions as well as being particularly suitable for developing new theories and ideas (Voss et al, 2002). Case research is widely used in several management disciplines, notably organizational behaviour and strategy (Voss et al, 2002).

To conclude, the researcher opts for case study strategy in this research particularly because the researcher initially believes that the case study method would be more advantageous considering the exploratory nature of the research questions. Also, case study research is gaining popularity in management research recently because it creates small-scale and context-specific implications and conclusions rather than universal findings. This approach suits more to today's research setting (Eisenhardt, 1989).

4.8 Selected Research Paradigm

Finally, it was valuable to assess the research paradigm considered suitable for this research. As previously mentioned, this research is an exploratory theory building research that starts from general to the specific. In addition, the research questions for this research are "How" and "What" questions. It could be identified that this research fits in the interpretivist paradigm. Figure 4.4 provides a description for the different choices that comprise this research paradigm.

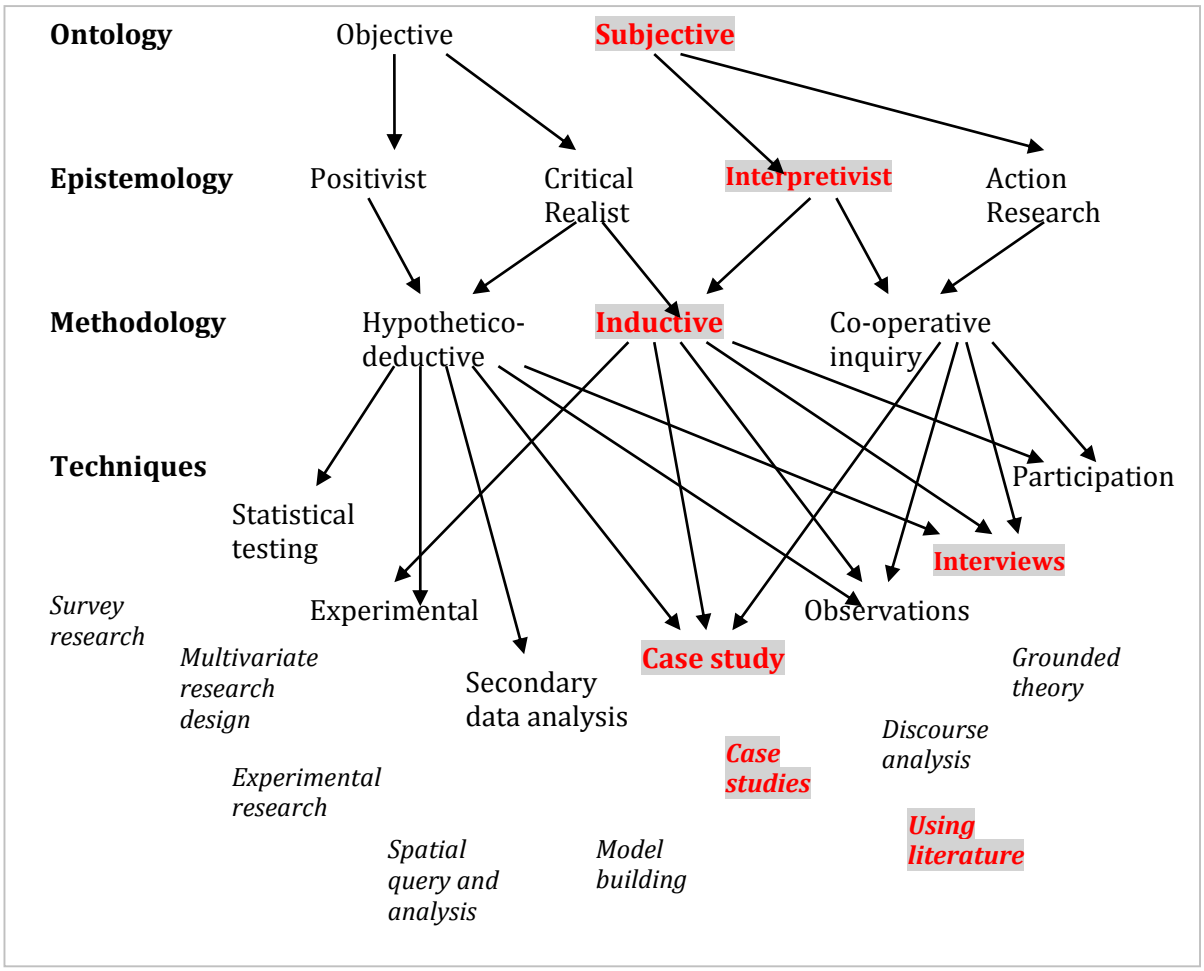


Figure 4.4. Research design choices (adapted from Beech, 2005)

4.9 Summary

The objective of this chapter was to clarify the concept of research methodology and its implications in conducting high-quality management research. The different research paradigms, as well as the characteristics of each paradigm and the associated philosophical positions, were described. It is suggested that the appropriate research strategy should be identified based on the research aim, questions, constructs and the philosophical preferences of the researcher. To this end, this chapter identified interpretivist as the most suitable paradigm for this research. In addition, this chapter justified the use of case study research as the most appropriate strategy to fulfill the research aim and provide answers to the research questions.

Next chapter will be discussed about the research design adopted in this research.

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.

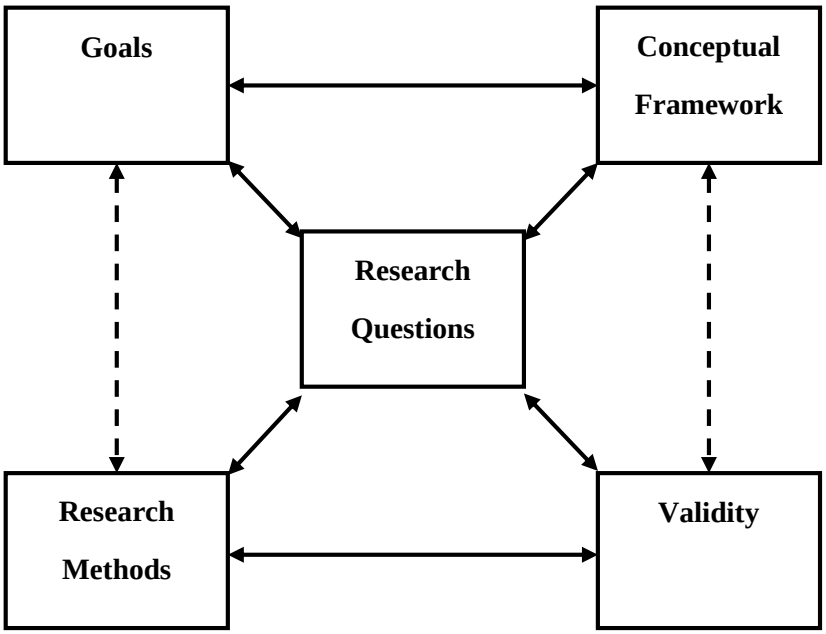


Figure 5.1. An Interactive Research Framework (Maxwell, 2004)

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	• 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	• 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	• 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	• 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: 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	• 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.

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 rational 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
1. The project must be a collaborative project involves: • Collaboration between several different organizations. • Collaboration in the same organization but between different departments.	√	√	√	√	√	√	√	√
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.	√							
3. The project must involve E-Collaboration Technologies or any internet-based tools as a medium of communication in the decision-making process.	√							
4. E-Collaboration Technologies that potentially adopted in Service Supply Chain such as video conferencing tools, instant messaging, online meeting tools etc. 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.	√	√	√	√	√			
5. E-Collaboration Technologies that potentially adopted in Manufacturing Supply Chain such as ERP system, EDI, CPFR etc. The 'supply chain' decisions involved in this cases are in terms of supplying tangible goods to suppliers and customers.						√	√	√

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) Tsunami (Ireland)	Project Director Project Manager	11/11/2011 2/12/2011	1 ½ hour 1 ½ hour	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? • How was the decision made? 3. What is the process? 4. What are the types of E-Collaboration Technologies
CS 2 Decision on development of 'Adaptive Capability Model.'	Strathclyde University (UK) Tsunami (Ireland)	Content Project Manager I Content Project Manager II	10/12/2011 13/2/2012	1 ½ hour 1 ½ hour	
CS 3 Decision on choosing the 'Sitefinity' software as a portal platform.	Simply Collaboration (UK) Strathclyde University (UK)	IT Project Manager Project Manager	3/2/1012 14/10/2011	1 ½ hour 1 ½ hour	

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

CS 8 Decision on managing order request and processing.	Highland Spring (UK) -Customer Service Team, - Planning team - Sales team	Demand Manager Customer, Supply and Logistics Manager	4/11/2012 27/11/2012	1 ½ hour 2 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?

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	▪ 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	▪ Retrievability- can be low ▪ Biased selectivity, if collection is incomplete ▪ Reporting bias-reflects bias of author ▪ Access-may be deliberately blocked
Archival Records	▪ Same as above for documentation ▪ Precise and quantitative	▪ Same as above for documentation ▪ Accessibility due to privacy reason
Interviews	▪ Targeted-focuses directly on case study topic ▪ Insightful-provides perceived causal inferences	▪ Bias due to poorly constructed questions ▪Inaccuracies due to poor recall ▪Reflexivity-interviewee gives what interviewer wants to hear
Direct Observations	▪ Reality-covers events in real time ▪ Contextual-cover context of event	▪ Time consuming ▪ Selectivity-unless broad coverage

		▪ Reflexivity-event may proceed differently because it is being observed ▪ Cost-hours needed by human observers
Participants observation	▪ Same as above for direct observations ▪ Insightful into interpersonal behavior and motives	Same as above for documentation ▪ Bias due to investigator's manipulation of events
Physical Artifacts	▪ Insightful into cultural features ▪ Insightful into technical operations	▪ 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.

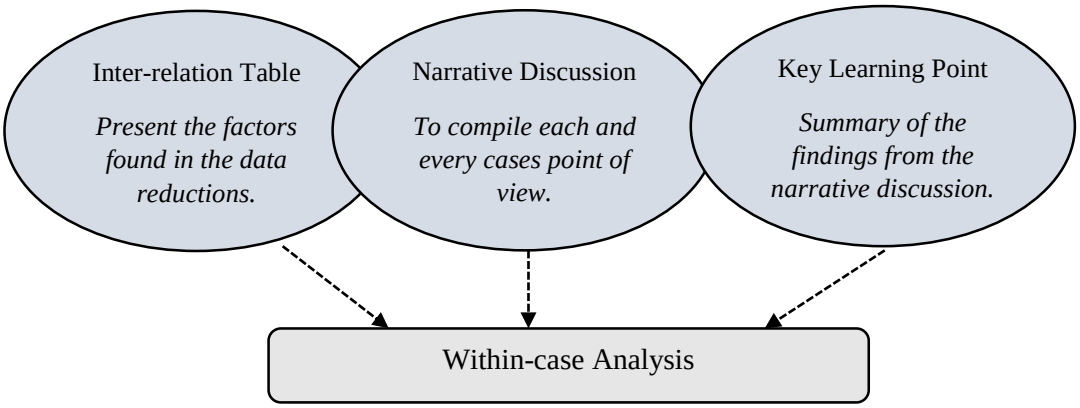


Figure 5.3 Different phases conduct in within-case analysis

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	• Use multiple sources of evidence • Establish chain of evidence • Have key informants review draft case study reports	Data collection Data collection composition
Internal validity	• Do pattern matching • Do explanation building • Address rival explanations • Use logic models	Data analysis Data analysis Data analysis Data analysis
External validity	• Use theory in single-case studies • Use replication logic in multiple-case studies.	Research design Research design
Reliability	• 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.

CHAPTER 6

EMPIRICAL FINDINGS (WITHIN-CASE ANALYSIS)

6.1 Within-Case Analysis

This chapter aims to provide insights into the different cases that were examined by this research. This chapter will draw the whole picture through in-depth analysis of the different examined cases. The within-case analysis process started when the researcher wrote a detailed case study report for each interviewed decision-maker. The case study reports were used as the raw data for the data analysis phase of this research.

The within-case analysis starts with the narrative discussion to compile each and every case study into two types of supply chain: service and manufacturing. The narrative discussion was then used to draw the key learning point tables which identify the impact of E-Collaboration Technologies on efficiency, effectiveness and trust development of collaborative decision-making involved in each case study. The narrative analysis and key learning point tables led to the development of the interrelationship table as in Table 6.10. The following graph, Figure 6.1, illustrates the flow of analysis undertaken in each case.

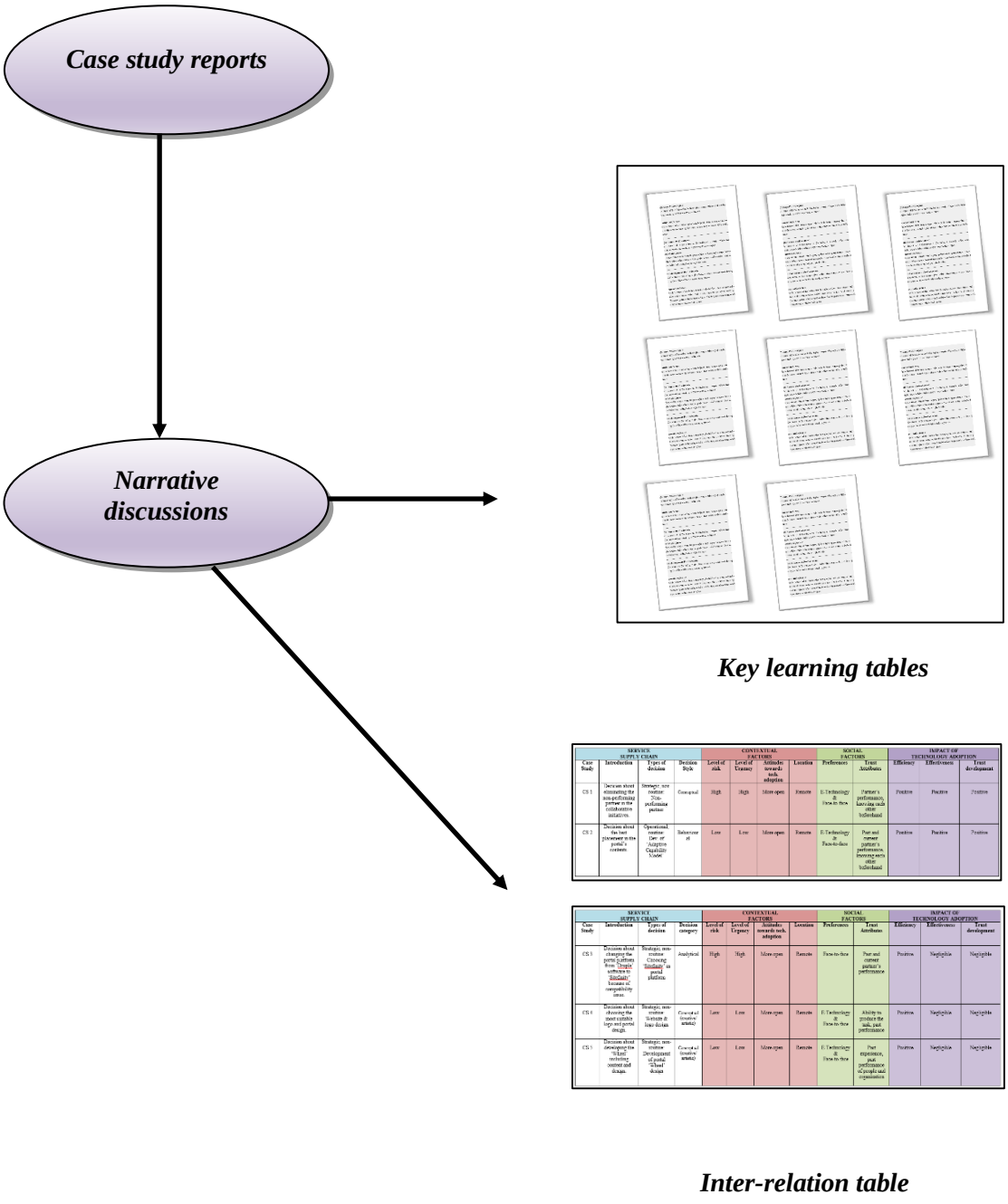


Figure 6.1 The flow of within-case analysis

6.2 Case Studies Background

Several authors argue the definition between manufacturing and service firms. Most visibly, the main defining characteristic between a manufacturing and service firm is that human labour is the primary component of the latter, while a physical product is that of the former. The characteristics that define each of these then, also differ. There are several characteristics that underpin the service and manufacturing industry. For example, Fisk et al. (1996) argues that the four major defining characteristics of a service industry from a goods industry are intangibility, inseparability of production and consumption, heterogeneity and perishability. Others, such as Pride and Ferrel (Pride & Ferrel, 2003) argue that there are six main defining characteristics: the previously-mentioned four and client-based relationships and customer contact. While some may argue that goods industries also incorporate these last two, it is the service industry, which relies on these characteristics as an inherent part of their service. In addition to intangibility, heterogeneity and perishability, Baltacioglu et al. (2007) also argues that simultaneity is another significant piece of a service system.

This research consists of eight case studies based on the two types of supply chains: ***service supply chain*** and ***manufacturing supply chain.*** The case studies comprise five cases for service supply chain and three cases for manufacturing supply chain. The unit of analysis for this research is ***'a collaborative decision'*** which adopt E-Collaboration Technologies during the decision-making process. Table 6.1 below represents the list of units of analysis for every case.

Table 6.1 The Unit of Analysis

Number of Case Study	**Types of Collaborative Decision (Unit of Analysis)**
Service Supply Chain	
CS 1	Decision on a non-performing partner
CS 2	Decision on development of 'Adaptive Capability Model'
CS 3	Decision on choosing the 'Sitefinity' software as a portal platform
CS 4	Decision on development of logo and design
CS 5	Decision on development of portal 'Wheel' design

Manufacturing Supply Chain	
CS 6	Decision on investment on production plant (Factory & warehouse)
CS 7	Decision on product distribution
CS 8	Decision on managing order request and processing

Case studies number one to five involved Service Supply Chain activities where each decision in the cases related to discussion on supplying expertise, consultations and information from different organizations towards the same collaborative project. Basically, the term Service Supply Chain creates more intangible offerings does not include managing tangible goods as what has been offered by manufacturing supply chain process (Boyer & Verma, 2009). Whereas, in case study number six to eight involved Manufacturing Supply Chain activities. These include activities on producing tangible goods at operational level, financial and budgeting at a strategic level as well as customers and supplier relationship.

The primary aim of the service supply chain (SSC) collaborative project was to develop a new model and a set of tools and methodologies for manufacturing SMEs in Europe, which will enable them to adapt to the changing economic environment and will lead them towards a sustainable business model. This project was a collaboration project with various companies and institutions across Europe, where every partner has their own respective tasks to deliver and supply knowledge and expertise to achieve a common goal. The collaborative project is known as the Future SME Project; it involves 26 companies across Europe and consists of consultants from various fields such as education organisations, SMEs, public organisations etc. The researcher managed to interview key decision-makers from Strathclyde University (UK), Technical University of Ostrava (Czech Republic), Simply Collaboration (UK), and Tsunami (Ireland), as has been presented in detail in Chapter 5.

The primary aim for the manufacturing supply chain (MSC) project was about implementing the information technology tools such as ERP and EDI as the manufacturers' main systems to control the operations and communication with

customer and suppliers. It is also to manage the challenges of the business, including managing a wide range of productions every day. The organisation involved in cases in the manufacturing supply chain is a Scottish one, the Highland Spring Company, which is a privately owned company which produces still and sparkling bottled water. The company is based in a small rural community in Blackford, Perthshire, Scotland and currently employing more than 300 employees. Their customers and suppliers consist of various types of retail companies, organisations, hypermarkets, etc. around the UK and Europe. The researcher had an opportunity to interview the Customer Service and Logistics Manager in Highland Spring. He represented the company and was involved in every aspect of the company's operations and collaboration. The researcher did not interview any of the Highland Spring's customers and suppliers due to the time constraint and considered the capability of the Customer Service and Logistics Manager to provide enough accurate information about their collaborative partners. All information provided by the Customer Service and Logistics Manager at Highland Spring was considerably enough for the case studies since he was importantly involved in customers and suppliers' collaboration engagements.

6.2.1 E-Collaboration Technologies involved in Case Studies.

The justification of selecting specific E-Collaboration Technologies for each cases are as follows:

There are three main E-Collaboration Technologies involved in the process of decision-making in the case studies. They are GoToMeeting which is specifically used in Service Supply Chain and ERP and EDI in Manufacturing Supply Chain.

- **GoToMeeting characteristics:**

GoToMeeting was developed by Citrix, it is a software that makes it simple and cost-effective to do online meeting with customers and colleagues all over the world. The meeting participants can share their webcams in high definition with simple setup. Besides that, GoToMeeting offers audio and video capabilities and it provides complete collaboration experience in a single interface. People can attend online

meeting from anywhere using their PC, Mac, iPad, iPhone or Android tablet. By eliminating unnecessary meeting travel, GoToMeeting helps enterprises cut costs and save time.

In Service Supply Chain case studies, GoToMeeting become the main method to get all the collaborated partners together in online meeting. It offers face-to-face with high definition video conferencing and it also able to do screen sharing, record the meeting sessions and share keyboard and mouse control to cooperatively edit files on screen. Those features offered by GoToMeeting makes the collaborative decision-making process easier just as same as face-to-face meeting.

- **ERP and EDI characteristics:**

ERP - Enterprise Resource Planning is a business management software that a company can use to store and managing data from every stage of business including product planning, cost and development, manufacturing, marketing and sales, inventory, shipping and payment etc. ERP provides an integrated real time view of core business processed and it able to track business resources such as cash, raw materials, production capacity as well as order, purchase and payroll. The application able to share data across the various departments such as manufacturing, purchasing, sales, accounting, warehouse etc. as long as they entered the data into the software. The collaboration works when the information flow between all business functions and manages connections to outside stakeholders. Organizations consider the ERP system as a vital organizational tool because of its capabilities to integrate varied organizational systems and facilitates error-free transactions and production.

EDI – Electronic Data Interchange is an electronic communication system that provide standards for exchanging data via any electronic means. By adhering to the same standard, two different companies even in two different countries able to electronically exchange documents such as purchase orders, invoices, shipping notices and others.

In this research, ERP and EDI become the main tools for collaborative decision-making between different departments in the same or different organizations since it able to share documentations.

6.2.2 The Circumplex Model of Group Task Types: Re-visited

In Chapter 3 section 3.3.6, the researcher discussed the Group Task Types as discussed by McGrath (1984). Variation between the channel of communication in group process and outcome is dependent on or interacts with task types. Figure 6.1 below shows the Task Types represented by each case discussed in this chapter. The decision to classify each case with suitable task types was based on their characteristics where the researcher decided which was the most accurate task type characteristic with types of collaborative decisions.

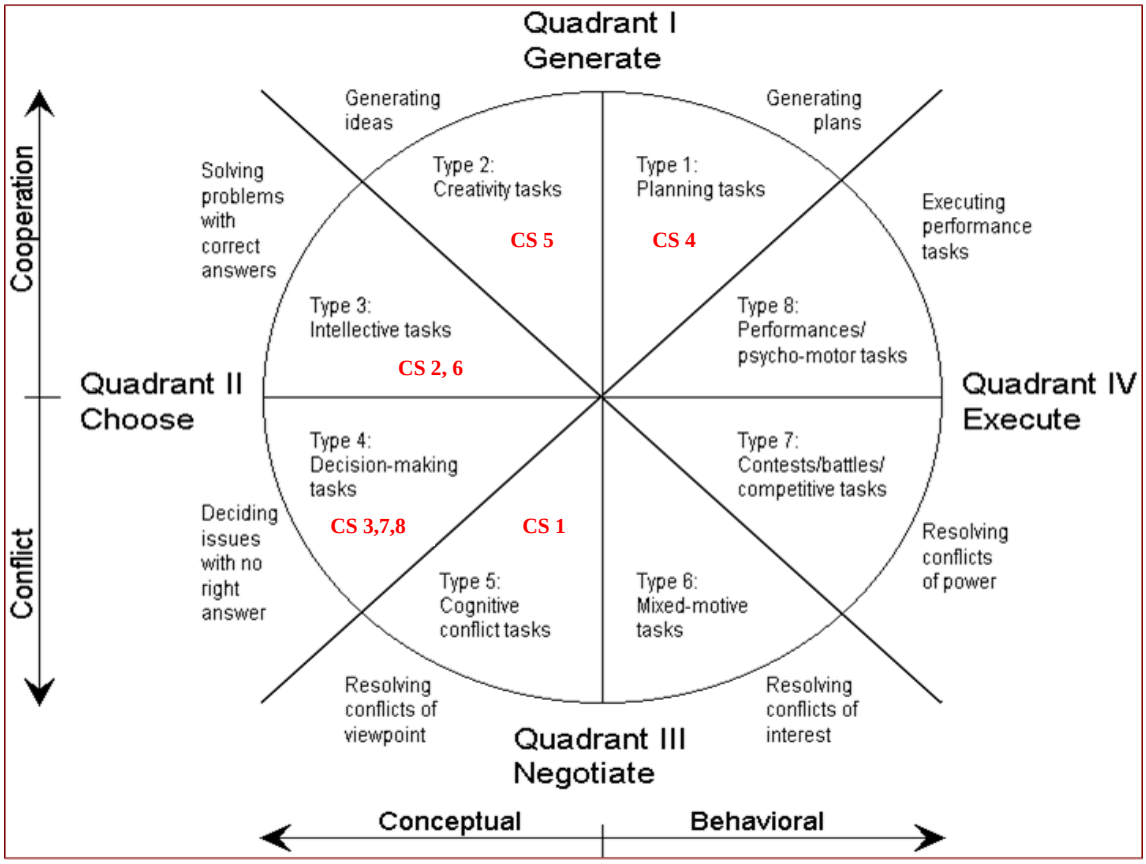


Figure 6.2 Circumplex Model of Group Task Types: Relationship to each case as in this research

6.3 Case Study 1

6.3.1 Case Study Overview

Case Study 1 involved two collaborative partners from the UK and Ireland. Tsunami is a company based in Ireland. It is a leading company in setting up and delivering collaboration projects throughout the EU. Tsunami specializes in R&D projects, company transformation, environmental sustainability and audio-visual technology. The University of Strathclyde, Glasgow, was involved in the research part of this project, including developing engagement with all of the project's partners. CS 1 involved the Project Manager from Tsunami and the Project Director from the University of Strathclyde as the key decision-makers.

Collaborative decision-making involved in CS 1 was about issues to eliminate a non-performance partner who was not able to deliver the outcome that had been agreed in the contract earlier. There were several processes involved before the final decision was made and E-Collaboration Technology became the method of communication between the group members across Europe. At an earlier stage of this problem, the strategic group members were discussing the issue in face-to-face meetings to collect all the evidence and then conducted the follow-up meeting via online tools. Finally, after several discussions, they took the decision to stop working with the non-performing partner, and the final decision was made via GoToMeeting. All of the participants in this decision process agreed that using E-Collaboration Technology enables them to speed up the decision-making process and had the ability to help them achieve the best decision. The reason was because using online tools was the quickest way to get them together, gave more focus and the discussion process went through smoothly without other people talking about other matters. Trust factors built up quickly after there were face-to-face meetings beforehand and a face-to-face meeting was able to support the final decision eventually.

6.3.2 Nature and Category of Decision

CS 1 is a strategic level, non-routine decision and it is under Conceptual style decision-making and is categorized under Cognitive Conflict task types. A non-routine decision is nonprogrammable and unique, based on the certain circumstances and issues that arrive and need special attention from the decision-maker. Decision-making in CS 1 involved all members of the steering committee, participating in giving an opinion and feedback regarding the issue of the non-performing partner in the collaborative initiative.

6.3.3 Contextual Factors

With respect to ***level of risk***, CS 1 is a high-risk type of decision where all committee members who participated in making the decision need to consider feedback and opinion from each and every team member working in the collaborative project in order to make sure they make the right decision. The process of making the decision was made through GoToMeeting as well as having a face-to-face discussion, since the committee members were remotely located across Europe.

The level of urgency of CS 1 is a high level of urgency type of decision. This is because they need to find a replacement for the eliminated partner in order to ensure the task can be completed on time and, moreover, it also involved budget allocation and funding issues.

Location is one of the important contextual factors in the nature of the collaborative project involved in CS 1. It is geographically dispersed across Europe and the team members are remotely located.

***Attitudes towards technology adoption*:** since the steering committee members were remotely located, most of the discussion involved in making the decision in CS 1 was done through online meetings. The acceptance towards using communication technology to make important decisions are more open and this helps them to have a faster and more efficient discussion about the issue. The Project Manager and Project Director agreed that using E-Collaboration Technology meant that they were able to expedite the decision-making process.

"… I think no doubt, E-technology helped us make a faster decision because the nature of this project is geographically dispersed, so several people had to fly somewhere to have a meeting…"

- Project Director (Strathclyde University)

"… Definitely made a faster decision with E-Collaboration Technology; I mean traditional methods such as email and phone calls, I don't think they will give the same level of understanding to everybody because with E-Collaboration Technology we are able to display documents we want to show to the partnership and everybody has the same level of understanding of what needs to be done…"

- Project Manager (Tsunami)

6.3.4 Social Factors

With regard to the ***preferences*** for medium of communication, according to the opinion given by the Project Director and Project Manager, who became the most important members in the steering committee group, the preference for using E-Collaboration Technology and face-to-face methods in making important and high-risk decisions has its own needs. Since the nature of the project is geographically separated, E-Collaboration Technology has given enormous impact in making the process of decision-making quicker and more effective. However, the face-to-face method is preferable in terms of interaction of the committee members in serious discussions, as was pointed out by the Project Manager.

"… I think ultimately face-to-face is ideally what you want to do because in face-to-face interactions, there is interaction with body language, there is a much better way to communicate with face-to-face.

- Project Manager (Tsunami)

This project started in 2009 and, under the collaborative initiative, the team members had met each other beforehand and they had already established a relationship. This

factor also contributed to the willingness and openness of using communication technology as a medium of communication even in the serious discussion and making a high-risk decision as in CS 1.

"… The steering committee meeting was in April 2011 and the project started in 2009, so all the partners knew each other reasonably well, they met each other face-to-face, so when we had this steering committee meeting online, it was just a matter of looking at fact, looking at the recommendation and making a decision…"

- Project Director (Strathclyde University)

In conjunction with collaborative initiatives, ***trust attributes*** are vital to ensure the trust development between organisations and the people inside the organisations are established. As in CS 1, the representatives Project Director and Project Manager come out with some points that helped in trust development along the process of making a decision. According to the Project Manager, a certain amount of knowing the past performance of the team member is one of the most important elements in building trust.

"… Well, trust is very personalized, you tend to trust somebody rather than an organisation. Trust is largely to do with individual… behaviour and experience with the person are the elements that are important to trust…"

- Project Manager (Tsunami)

6.3.5 Impact of Technology

With respect to the technology adoption towards ***efficiency*** of collaborative decision-making, the usage of E-Collaboration Technology gave a Positive impact in the collaborative decision-making process. Technology's role helps the team to manage information and at the same time making faster decisions. As agreed by the Project Manager, to achieve the result of technology adoption efficiency, in this case it still relates to the factors of trust where the trust background is somehow needed in order to develop further bonding in the collaboration.

"… I think technology is helpful in making efficient collaborative decisions, but trust is a very important element of that because all the participants in that meeting know each other and have met beforehand…"

- Project Manager (Tsunami)

The impact of technology towards ***effectiveness*** in collaborative decision-making was also being observed and the result is it gives a Positive impact in the decision-making process. This condition resulted from the geographical and temporal distance between the main decision-makers that made them prefer to use E-Collaboration Technology as a medium of making a fast, yet correct decision.

"… So the decision is the right decision irrespective of what kind of technology that we used, but the e-meeting technology that we used allows everybody to participate to discuss the decision and contribute their own input into that decision…"

- Project Manager (Tsunami)

"… I think we made a right decision, and I think the decision was compromised because of the technology. In the group discussion, people who shout the loudest, speak the most and who dominate the conversation can stir discussion… I think e-meeting technology helps us to make a decision quicker; online is the quickest way to make it together…"

- Project Director (Strathclyde University)

With regard to the impact of technology towards ***trust development,*** it gives a Positive impact where this result means the adoption of E-Collaboration Technology was able to help them make collaborative decisions. Most of the decision-makers in this specific decision agreed that the nature of the geographical dispersal among the project members is the main reason why they opted to use E-Collaboration Technology as a medium of communication. However, trust had been built beforehand in the face-to-face meeting before the project started; this condition supported the trust development during the process of making the decision electronically.

"… So I think when we came to make a decision and we actually had discussed about the partner's performance in the previous face-to-face meeting, we had a general understanding about the issue… I think if this will be, say, one of the first decisions that the steering committee had to make without having met each other before, I think it will be difficult… I think because we know each other, we knew a little bit more about the project and we knew about the partner's past performance, it helps build trust among the group…"

- Project Manager (Tsunami)

"… I would prefer sitting face-to-face to make a decision with a stranger, but because we had built trust within the team members beforehand, the decision-making process for this specific issue was able to be made electronically using GoToMeeting software… "

- Project Director (Strathclyde University)

6.3.6 Concluding remarks

CS 1 can be seen as one of the success stories of using E-Collaboration Technology as a method of communication, specifically in making a strategic decision. The key decision-makers in CS 1 are mainly working in the high technology environment, which affects their acceptance of using E-Collaboration Technology as a communication method with regard to their geographical remoteness. The preferences of using both conventional and E-Collaboration Technology as a way of communication resulted from the types of specific issues on which they would like to decide. Knowing the partner's performance in other projects and knowing the collaborated partners beforehand were some of the important points before performing collaborative decision-making in CS 1. E-Collaboration Technology gives a Positive impact on the efficiency and effectiveness of collaborative decision-making. E-Collaboration Technology is able to help key decision-makers in CS 1 achieve collaborative decision-making as it gives a Positive impact in terms of trust development.

6.3.7 Key Learning Points

The following table, Table 6.2, aims to highlight the key learning points from this case study.

Table 6.2 Key learning points (CS 1)

This case identifies the impact of E-Collaboration Technologies towards…
• ***Efficiency: Positive impact.*** The impact of E-Collaboration Technologies on the efficiency of collaborative decision-making in CS 1 was a Positive impact. This is because of the technology's role helps the team to manage information and at the same time making a fast decision since they were remotely located across Europe.
• ***Effectiveness: Positive impact.*** The impact of E-Collaboration Technologies on effectiveness of collaborative decision-making in CS 1 was a Positive impact. This condition resulted from the geographical and temporal distance between the main decision-makers that made them prefer to use E-Collaboration Technologies as a medium of making fast, yet right decision. Adopting E-Collaboration Technologies in the decision-making process were the quickest and easiest way to get them to stay together and making decision collaboratively. If face-to-face were to arrange, it might be one or more partners will be missing due to other commitment and time constraints.
• ***Trust development: Positive impact.*** E-Collaboration Technologies give Positive impact towards trust development between the decision-makers during the collaborative decision-making process. This is because of the factors that they adopted both conventional and online methods of communication. Besides that, they had the history of knowing other collaborated partners beforehand and identified the partner's performance before the collaborative initiative take place. These factors contribute to the confidence of using E-Collaboration Technologies as their method of communication as they already developed the initial trust beforehand.

6.4 Case Study 2

6.4.1 Case Study Overview

Case Study 2 involved two collaborative partners from the UK and Ireland. Tsunami is a company based in Ireland. It is a leading company in setting up and delivering collaboration projects throughout the EU. Tsunami specializes in R&D projects, company transformation, environmental sustainability and audio-visual technology. The University of Strathclyde, Glasgow was involved in the research part of this project, including developing engagement with all of the project's partners. CS 2 involved Content Project Manager II from Tsunami and Content Project Manager I from the University of Strathclyde as the key decision-makers and members of the Technology Board.

The Technology Board is responsible for the contents of the portal and business model development and it includes most project partners across Europe. This group only had face-to-face meetings every three months and other communications were via online tools. There was collaborative decision-making in developing the content for the portal and one of the decision was about where the content was best placed in which category. The communication about this decision was mainly using E-Collaboration Technology while most of the project members involved in this task were located across Europe. However, in the process of discussion and making a collaborative decision, issues about different languages and misinterpretation became the problem in the situation of having online meetings involving a large group of members. The participants in this group agreed that making collective decisions were effective using E-Collaboration Technology but it should be done in a small group of people. This will result in trust development among the partners on what they should deliver for the specific task.

6.4.2 Nature and Category of Decision

CS 2 is an operational level, routine decision and it is Behavioural style decision-making and is categorized under Intellective task types. This decision was discussing about the development of the 'Adaptive Capability Model' for the portal where it includes the application development and to decide on where the contents were best

placed. In this decision, there were Technology Board members consisting of the adaptive capability content manager and some other sub-tasks managers such as in the area of innovation, organisational learning, change management and resilience, who are responsible for managing the information and carrying out decision-making.

6.4.3 Contextual Factors

With respect to ***level of risk,*** CS 2 is a low-risk decision. The decision dealt with arranging the information to be placed in the portal, developing the applications and making sure to put the content in the best place, whether in the 'operational capability' or 'adaptive capability' area; it also required richness of information. It was a non-routine process and decision made using several E-Collaboration Technologies such as email, Skype and GoToMeeting.

The ***level of urgency,*** CS 2 is categorized in low levels of urgency types of decision. In this condition, the decision only dealt with the specific area, which is 'adaptive capability', and the selection of best contents was only considered within this area. The team members took the process of making decisions together and obtaining the consensus agreement before making the final outcomes. This was to avoid misunderstanding and putting the content into a wrong placement in the portal.

Location, is one of the important contextual factors in the nature of the collaborative project involved in CS 2. The team members were geographically dispersed across Europe and they were remotely located.

Attitudes towards technology adoption, since all the team members involved in making this specific decisions were remotely located across Europe, they all agreed that using E-Collaboration Technology was the quickest way to get the decision made, hence, it can be used across the boundaries, and is able to share documents, files and information, and enables users to make decisions faster. The acceptance towards using technology is more open.

"… I think with E-Collaboration Technology it helps make decisions quickly; we have meetings face-to-face three months at the very most and it will be absolutely

impossible to make decisions there and then… before doing weekly meeting via E-Collaboration Technology, the progress was quite slow but since we organized the weekly meeting that is really helpful and actually moving the things forward and actually get the content ready for the portal… "

- Content Project Manager I (University of Strathclyde)

6.4.4 Social Factors

Preferences is a measurement of the medium of communication that is preferable to be used in the process of making a decision. The nature of communication style between the team members was rarely face-to-face – once every three months at the very most because of the geographical dispersal. They took the opportunity to use GoToMeeting for weekly online meetings and follow-up discussions through email.

With regard to the ***trust attributes,*** the most important point in this specific decision-making is knowing the past and current partners' performance and knowing the collaborative partners beforehand. Since they had assigned some different tasks to each team member, the capability and ability of the team members are most important to deliver the outcomes. The Content Manager needed to make sure that everybody knew their task and where the content should be best placed in the portal.

"… I think you probably can work and make decisions with a stranger, but it is more difficult, but I think it is possible. But I think the most important thing is you have experience working with them and how you can organize having an online meeting with them. Other tangible approach is important, you have to like the people as well, and you have got to know them so you can build more trust… "

- Content Project Manager II (Tsunami)

6.4.5 Impact of Technology

With respect to the technology adoption towards ***efficiency*** of collaborative decision-making, in CS 2, most of the communication was held using email and e-meeting facilities and it gives a Positive impact towards assisting the decision-making process. This is because of the location and mobility of team members. They agreed

that using E-meeting technology enabled to speed up their progress. However, there were some issues that occurred during the process of making collaborative decisions using GoToMeeting. Technical issues are something that needs to be taken into account when dealing with technologies. In this situation, some technical issues occurred during the online meetings such as a slow internet connection that caused delay in the electronic conversation. On some other occasions, there were technical problems during logging on to GoToMeeting, and it takes time to make sure everybody involved in the meeting is comfortable with the video and sound quality.

"… I would prefer to use email rather than Skype besides using the GoToMeeting facility to communicate with other team members… but unexpected things can happen in the meeting, there were technical problems because GoToMeeting is very unpredictable and sometimes people cannot log on and sometimes we waste like ten minutes of the meeting just to make sure everyone is OK… "

- Content Project Manager I (University of Strathclyde)

Dealing with the ***effectiveness*** of collaborative decision-making with adoption of E-Collaboration Technology, fast and wise decisions have been made through GoToMeeting; it gives a Positive impact. The geographical dispersal among the team members is the main reason why they chose to use E-Collaboration Technology as the main communication method. As mentioned by the Content Manager, E-Collaboration Technology is more suitable to be used in small groups to discuss and make decisions rather than in a big group. The decision-making process ran more smoothly and effectively while they were discussing issues in a small group.

"… I think in the adaptive capability model section I don't think any decision could be made without E-Collaboration Technology; I think it all can be done over the technology… We have the technology board meeting once in a month but I think there were so many arguments if the meeting was done through online meeting. This happens because there are too many people attending the technology board and since it is done through GoToMeeting, it is very difficult to coordinate and have any

decision made… and because of the face-to-face meeting we were actually able to build enough people to make decisions…"

- Content Project Manager II (Tsunami)

With regard to the impact of technology towards ***trust development,*** it gives a Positive impact towards collaborative decision-making. The Content Manager in CS 2 agreed the most important factor that built the trust development is meeting the project members before the collaboration started. Since some of the members knew each other, the trust development built up quickly and this scenario helps them to make wise decisions together.

"… Well, I trust all my colleagues and I think the reason why I trust them all is because I met them before hand face-to-face, so if I am speaking to these people who are complete strangers and I never met them before then probably they are trustworthy. But since I met them in a face-to-face environment every three months, I built a relationship with them so it's a lot easier to trust them because of that… "

- Content Project Manager II (Tsunami)

6.4.6 Concluding remarks

CS 2 is one of the positive stories of adopting E-Collaboration Technology for non-routine decision category, low level of risk and low level of urgency types of decision. The team members in CS 2 were mainly the portal content developers, where most of their time was working with the computer software and systems. They show a more open attitude towards technology adoption with regard to the partner's remotely located across Europe. The preference of using both face-to-face and E-Collaboration Technology as methods of communication was mainly an impact from the meeting style they have had on the team, where they will be having a face-to-face meeting every three months and most of the time this has been assisted by the GoToMeeting e-meeting technology. Knowing the project team members beforehand and identifying the past and current partners' performance are prerequisites in trust development attributes in CS 2. The impact of technology on CS 2 resulted in a high impact on efficiency and high impact of effectiveness. E-Collaboration Technology

gives a Positive impact towards trust development on assisting the collaborative decision-making in CS 2.

6.4.7 Key Learning Points

The following table, Table 6.3, aims to highlight the key learning points from this case study.

Table 6.3 Key learning points (CS 2)

This case identifies the impact of E-Collaboration Technologies towards…
• ***Efficiency: Positive impact.*** The impact of E-Collaboration Technologies in efficiency of collaborative decision-making in CS 2 is a Positive impact. This is because most of the routine activities in CS 2 were done online, including file transfer, short discussion through Skype and extensive communication by email was adopted. Moreover, the decision makers involved in CS 2 were remotely located across Europe and some of them were located within the UK.
• ***Effectiveness: Positive impact.*** The impact of E-Collaboration Technologies in effectiveness of collaborative decision-making in CS 2 is a Positive impact. The geographically dispersed among the team members were the main reason why they chose to use E-Collaboration Technology as a main communication method. Moreover, the decision-making process was run smoothly and effectively through E-Collaboration Technologies while they were discussing in a small group.
• ***Trust development: Positive impact.*** E-Collaboration Technologies give a Positive impact in trust development during the collaborative decision-making process. This is because of the factors that they adopted both conventional and online methods of communication. Other than that, identifying partner's past and current performance and knowing the partner's beforehand was the contributing factors to give a Positive impact towards trust development in CS 2.

6.5 Case Study 3

6.5.1 Case Study Overview

Case Study 3 involved three collaborative partners from the UK and the Czech Republic. Simply Collaboration and the University of Strathclyde are organizations based in the UK. Simply Collaboration is a company which is an expert in designing and implementing business processes across supply chains. The University of Strathclyde, Glasgow is involved in the research part of this project, including developing engagement with all of the project's partners. The Technical University of Ostrava is involved as a research partner and manage SMEs from the Czech Republic. CS 3 involved the IT Project Manager from Simply Collaboration, Project Manager from University of Strathclyde and Project Coordinator from the Technical University of Ostrava as the key decision-makers. They are also members of the Technology Board for this project.

The Technology Board members are the ones who are responsible for managing and handling the development of the project. One of those responsible for making key decisions is the IT Manager, who managed most of the architecture, support and programming part. The collaborative decision-making involved in CS 3 was a decision about changing the web content management system from software called 'Drupal' to 'Sitefinity' because of compatibility and technical issues. This decision was quite complex as it involved many departments that manage different parts of the portal development. Some technical issues with one of the partners also occurred during the process of developing the portal, which led to the decision to change the software platform. Most of the discussions with other Technology Board members across Europe used GoToMeeting but because of geographical dispersal among them, it was difficult to discuss some technical issues online rather than during face-to-face meetings. The language barrier has also become one of the obstacles to face during online meetings; this is because some of the partners are not native English speakers. In terms of trust development, the key attributes to build trust is to know current and past performance of the partner who is responsible for delivering the outcomes; since CS 3 involved a technical part, the partners' skills and ability are more important things to consider.

6.5.2 Nature and Category of Decision

CS 3 is a strategic, non-routine decision and it is an Analytical style decision-making and is categorized under Decision-making task types. The collaborative decision focused on technical issues in the content management system: changing the platform from one type of software to a new one because of the compatibility issue. The Technology Board members were responsible for making the decision with regard to the partners' feedback and outcome of the technical issue.

6.5.3 Contextual Factors

With regard to ***level of risk,*** CS 3 is a high-risk decision. There was some technical issue with an important partner who was unable to deliver the outcome as agreed. They supposedly to manage the portal, but after a few months they delivered nothing. Since some other partner did not have the required skills, they decided to change the platform from 'Drupal' to 'Sitefinity', as they have more expertise in the latter. It was an extremely high-risk decision they took to start all over again with the portal; however, to avoid things getting worse, the collaborative decision was taken. The decision to use 'Sitefinity' was because it is easy for the end user to use and because it was able to be integrated with everything else the developers had done before in the project.

To deal with the ***level of urgency:*** CS 3 is a high-urgency level decision. The decision was dealing with technical capability offered by the project partners, but in the middle of portal development, they were unable to deliver the outcomes. It was vital the Technology Board made an urgent decision in order to make sure the progress could proceed accordingly.

Location, the team members were remotely located across the UK and Europe. In terms of communication, most of them were using GoToMeeting and email for discussion and as well as face-to-face meetings.

Attitudes towards technology adoption:, most of the team members in CS 3 are technologically literate because of their job nature, which is in IT environment. In terms of attitudes towards technology adoption in collaborative decision-making, they are more open to communicate and make discussions through online meetings.

"… GoToMeeting works very well because it works most of the time and it is rather easy to use conference tools and easy to share the screen…"

- IT Project Manager (Simply Collaboration)

6.5.4 Social Factors

In terms of ***preferences,*** the CS 3 IT Manager agreed that using online technology was able to help the team members communicate very well during the process of portal development, but in terms of the specific decision in CS 3, surprisingly the IT Manager said that online meeting was actually not helping much in making the collaborative decision because of the complicated nature of the decision itself.

"… If you're making a decision that is quite explicit, then it's easy; for example, if I'm buying an IT system I think it's quite easy to use online meeting tools… but if I'm buying executive coaching for myself I probably want to meet you first because it involves chemistry between you and the person. So if chemistry important to what need to be delivered as in this decision of the portal, then no, but if there is something really explicit and obvious than I think we-collaboration is fine… "

- IT Project Manager (Simply Collaboration)

"… I think it depends on the complexity of the decision that needs to be made. In this particular case, it is quite a big move to move from 'Drupal' to 'Sitefinity', and it would be better if we had discussed it face-to-face… but because of the nature of this project and we have so many partners in different locations, we don't have time to do meetings face-to-face. So the online meeting is the best alternative tool for that particular case… "

- Project Manager, University of Strathclyde)

With respect to ***trust attributes,*** the most important trust attributes as mentioned by the Project Manager and IT manager in this collaborative project are knowing the past and current partners' performance. This is because some of the project partners never collaborated or worked together before. Knowing their success and failure stories with their previous projects is vital in order to choose the best partners to work together.

"… Trust is vital. Particularly when making decisions and if particularly you made decisions online you have to trust people who are involved in the decisions more than if you meet face-to-face because you don't have the full interaction with people online, so you are relying on trust a lot, so that people know what they're talking about and they know what they're saying and what they're recommending. So trust is vital…"

- Project Manager (University of Strathclyde)

"… Together success of the project is important, but to some extent I don't trust everybody I worked with and do what they say, and part of learning on the project is to know who actually does what they said and who doesn't. In this project, the most important thing is to know the partners' past performance and success or failure story. It will help in choosing the best partners…"

- IT Project Manager (Simply Collaboration)

6.5.5 Impact of Technology

With respect to the technology adoption towards ***efficiency*** of collaborative decision-making, CS 3 gives a Positive impact result. This condition resulted from the facilities offered by the E-Collaboration Technology they used to assist the communication process between partners in remote locations'.

"… One advantage of using GoToMeeting or Skype is we can share the screen more easily, but if we didn't know that we can just use email and we can talk through them (the issues). So, email is good at getting images between people, speeds that up, but it doesn't improve the decision except by speeding the transfer of information. GoToMeeting works very well, because it works most of the time and it is rather easy to use conference tools and easy to share the screen…"

- IT Project Manager (Simply Collaboration)

"… I think in this particular case, if straightforward decision and decision-making criteria are presented, I think those can be helpful decided on e-technology, but for a more complex decision you need a certain amount of trust as well as having criteria developed to the decision that needs to be made…"

- Project Coordinator (Technical University of Ostrava)

With regard to ***effectiveness*** of collaborative decision-making in adopting E-Collaboration Technology, surprisingly the result is a Negligible (low) impact on effectiveness. The notion that can be concluded from this scenario is because of the complexity and difficulty towards making the collaborative decision for this specific issue, E-Collaboration Technologies were not suitable to be adopted. The person who is responsible for and who understands most of the technical part of this issue suggested having a face-to-face meeting with other partners who have expertise in their specific tasks. The decision taken in CS 3 is quite risky since it involves changing the platform of the portal. However, he agreed that is was best to use E-Collaboration Technology to discuss the follow-up actions.

"… I think in this specific issue, it is preferable if people meet face-to-face because it is easier to discuss and easier to draw things on a flipchart and easier to have interactive discussion…"

- Project Manager (University of Strathclyde)

To deal with the impact of technology towards ***trust development:*** the result is a Negligible (low) impact. The IT Project Manager has mentioned that in CS 3 there were issues around language among the Technology Board members; this is because of the multi-cultural nature of the members involved in the collaborative project which somehow gave a Negligible (low) impact to building trust initially.

"… I think there are issues around language, because when you talk to someone who is a non-native English speaker you find most of the time; for example, in the Technology Board, they don't know what is happening because the project was run by native English speakers, and a lot of them are using words that are not easy to understand… so I think there are certain issues on language that avoid building initial trust and certain issues that they are not delivering what they are supposed to do…"

- IT Project Manager (Simply Collaboration)

6.5.6 Concluding remarks

CS 3 is one of the unique cases in E-Collaboration Technologies adoption for routine decision category with high level of risk and a high level of urgency types of decision. It was a decision about changing the portal platform from previous software to a new one because of the compatibility issue. Team members in CS 3 are mostly people who have high IT literacy. This is because their job task and environment are related to the computer system development. Because of this factor, they have an open attitudes towards technology adoption with regard to their geographical distance. However, surprisingly, although most of the CS 3 team members are IT literate (because of their job task and working environment, which are related to computer system development, their preference for collaborative decision-making was mainly via the conventional method, which is face-to-face and not via E-Collaboration Technology. This condition resulted from the complication and difficulty of the issue that arose in CS 3 where it is somehow impossible to achieve the final decision if the discussion about the issue is conducted through e-meeting facilities.

The impact of technology towards CS 3 is high on efficiency, but low on effectiveness. The E-Collaboration Technology is able (efficiency) to help them in terms of information transaction but not in terms of methods of communication (effectiveness). With this situation, CS 3 obtained a Negligible (low) impact on trust development as E-Collaboration Technologies might hinder them to achieve collaborative decision-making.

6.5.7 Key learning points

The following table, Table 6.4, aims to highlight the key learning points from this case study.

Table 6.4 Key learning points (CS 3)

This case identifies the impact of E-Collaboration Technologies towards…
• ***Efficiency: Positive impact.*** The impact of E-Collaboration Technologies on the efficiency of collaborative decision-making in CS 3 is a Positive impact. This is because of the factors that they were adopting E-Collaboration Technologies for a short discussion through Skype and extensive communication by email. It was the quickest way to get them together since they were remotely located before having a face-to-face meeting.
• ***Effectiveness: Negligible (low) impact.*** The impact of E-Collaboration Technologies on effectiveness of collaborative decision-making in CS 3 is a Negligible (low) impact. This was because of the complex nature of the decision where it was not convincing to do technical decision through online meeting and discussion. The face-to-face approach became the most promising way in order to do collaborative decision-making in CS 3.
• ***Trust development: Negligible impact.*** E-Collaboration Technologies give Negligible (low) impact on trust development during the collaborative decision-making process. This was because of the complex nature of the decision itself, which was difficult to be presented and discussed online. Collaborative decision in CS 3 requires IT specialists and programmers to sit down together and do the problem solving based on the technical aspects, also to avoid the language barrier in online discussion. Before the collaboration started the collaborative partners have known their ability and identified the partner's past and current performance as a trust factor to start the collaboration.

6.6 Case Study 4

6.6.1 Case Study Overview

Case Study 4 involved two collaborative partners, Simply Collaboration and the University of Strathclyde, based in the UK. Simply Collaboration is a company that is expert in designing and implementing business processes across supply chains.

The University of Strathclyde, Glasgow is involved in the research part of this project, including developing engagement with all of the project's partners. CS 4 involved the IT Project Manager from Simply Collaboration and the Project Director and Content Project Manager I from the University of Strathclyde as the key decision-makers and members of the Technology Board.

Collaborative decisions included in Case Study 4 (CS 4) involved tasks in designing the web portal and deciding on the most suitable project logo. There was an issue of who should make the design, which design should be chosen and how it would eventually look. Most of the conversation did not work online when it involved discussions on creative and artistic solutions and brainstorming was needed in the decision process. Participants in this group agreed that creative decisions such as deciding on colour schemes, fonts and graphic design mainly worked by having a face-to-face meeting, as it was more interactive. However, in the process of making a collaborative decision about logo design, online voting system was chosen as the decision-making process. Trust played a key role in this process because the voting system requires a transparent approach in order to get the best result.

6.6.2 Nature and Category of Decision

CS 4 is a strategic, non-routine decision under Conceptual style decision-making and is categorized under Planning task types which requires creativity and artistic problem-solving. The collaborative decision in CS 4 focused on designing the portal as well as deciding on the best logo for the project. Collaborative decisions involved in CS 4 included website design, look and feel, logo, colour scheme and content. There are three main key decision-makers in CS 4: the Project Content Developer, Project Coordinator and Project Director.

6.6.3 Contextual Factors

Level of risk: CS 4 is a low-risk decision. The decision on choosing the best website designer has been decided collectively by the main key decision-makers in this project. There were some options to consider based on the company portfolios. Eventually, the Technology Board members chose an internal graphic designer from the University as their main designer for the portal. Since they had worked together

before on other projects, the relationship between developer and designer was well established. This became the main factor in the low-risk decision.

With regard to ***the level of urgency,*** CS 4 is in the low-urgency decision category. The collaborative decisions on choosing the best project logo design took part by using a voting system, which did not take a long time to reach the decision. Meanwhile, for website design, the Technology Board members decided to use an internal designer from the University who has the right skill to do the job.

In terms of ***location,*** the team members involved in CS 4 are remotely located across Europe. Most of the communications were held through email and GoToMeeting at the early stage of the project and face-to-face after that.

Attitudes towards technology adoption: the result turned out to be more open to accepting E-Collaboration Technology as their medium of communication. Most of the discussion took place through email and GoToMeeting except for the decision that involved artistic ideas and creativity, where the face-to-face medium was preferable.

"… It was mainly based on email; apart from that, we also used GoToMeeting. E-technology makes the process easier, especially in our context because our project is an international project and includes international partners located in different countries…"

- Project Content Developer (University of Strathclyde)

6.6.4 Social Factors

In CS 4, the key decision-makers agreed that ***preferences*** for using conventional methods like face-to-face as their medium of communication, rather than using E-Collaboration Technology. This condition is mostly applied in deciding on website design since it involves creative ideas and tasks, while in the process of choosing the best project logo, online voting system became the channel for key decision-makers since it can be said that this was a simple decision to make. In giving his opinion about the preferences in methods of communication, the Project Director said that;

"… For the decisions involved in, such as website design, look and feel, logo, colour scheme and content, about artistic design or content design, we try to hold an online meeting to discuss what it will look like and it wasn't working and this is in an early phase of the project. We were having an online meeting and we were not going anywhere, the guy who is responsible for the website is not expert in IT so he doesn't understand and it was difficult to deal with it. So we had a meeting face-to-face and these entire problems disappeared…"

- Project Director (University of Strathclyde)

Meanwhile, for the decision about choosing the best project logo, the process went through an online voting system, as mentioned by the Project Content Developer:

"… It was based on an online voting system; basically I gave each of the alternatives logo and I asked the partners to give me their top three choices and based on their top three preferences I put them in common consensus and then we have decided collectively on the final logo…"

- IT Project Manager (Simply Collaboration)

With regard to ***trust attributes:*** based on the interview, the main trust attributes that are important in CS 4 are the ability of the partners to produce the task and partners' past performance. In the website design task, the ability of the internal graphic designer has been proven by their current and previous projects with the University. To some extent, the trust relationship has been built up and proven. As mentioned by the Project Director and Project Content Developer:

"… I think trust is very important, especially with this project, (where) everybody is depending on everybody else. In choosing the website designer, that was easy because we use the designer from the University; we used them before to design a brochure and something else and we know them. So because we know them, there is a working relationship…"

- Project Director (University of Strathclyde)

"… Trust played a key role I believe. I'm saying this for a number of reasons: first of all the voting system requires some transparent approach, you need to show the partners their ideas, and their suggestions were considered, so they can trust you as the coordinator… the partners should trust you as a coordinator and talk with the designer in order to get the best alternatives, so trust played a key role in terms of getting the best product…"

- Project Manager (University of Strathclyde)

6.6.5 Impact of Technology

With respect to the technology adoption towards ***efficiency*** of collaborative decision-making, the result showed a Positive impact. Most of the discussion about choosing the best project logo took place through email and GoToMeeting as well as an online voting system. The facilities offered by these e-collaboration technologies were able to help team members make a fast and accurate decision.

"… E-Collaboration Technology helps make faster collaborative decisions. I believe electronic tools definitely make the process easier, especially in our context because we are an international project and include international partners. So it would be much slower if we involved all our partners in decision-making with the face-to-face meeting environment and it will be more costly and much slower. So from the perspective of constraint of cost aspect and also the practicality, electronic tools such as GoToMeeting and email definitely the kind of speed up the process in our case…"

- Project Content Developer (University of Strathclyde)

Meanwhile, from the perspective of making a collaborative decision for graphic designing, the key decision-maker mentioned that the task involved in creative thinking and artistic design, so he would prefer the team members to discuss face-to-face with the graphic designer.

"… We talked about the creative decision; I think in certain aspects it can be done online, for example, if you have some designs and need the group to vote… but if you want to have deep conversations about it I'm not too sure if we can do that online. I

think for creative conversation and decision it maybe not as useful to use online tools…"

- IT Project Manager (Simply Collaboration)

In the context of impact on E-Collaboration Technology towards ***the effectiveness*** of collaborative decision-making, the result indicates a Negligible (low) impact on effectiveness. However, in the context of CS 4, this scenario is significantly with the type of collaborative decision where it involves creative and artistic thought. As mentioned in the impact on efficiency, the result shows that it does have a Positive impact towards efficiency, but a Negligible (low) impact on effectiveness. At some points, the E-Collaboration Technology is useful in helping the team members to quicken the follow-up process, but not in terms of assisting them as a medium of communication.

"… If you make a strategic decision, probably it should be face-to-face because, for instance, in our project, the leader is the main key decision-maker and they get together to kind of specifying the future of the project… but if it is more about details, for instance, I have made a decision by email and online meeting only in order to develop graphic and pictures and I had made a decision with our partner in the Czech Republic only using e-collaboration tools…"

- Project Content Developer (University of Strathclyde)

"… I think it is effective to do collaborative decision via online tools if there is a fact and logical thinking and mechanistic logical process; if the decision is a fact based, then the decision can be made online but in negotiation and creative decision it's not helpful…"

- IT Project Manager (Simply Collaboration)

In relations to ***trust development,*** the result from the interview shows that E-Collaboration Technology give a Negligible (low) impact on trust development. To some extent, one of the key decision-makers agreed that online tools able to help to build trust, but, since some of the project team members had known each other

beforehand, it became easier for the trust development to take place. However, she agreed that it is not necessary for the project team members to meet face-to-face beforehand to build trust but it helps.

"… I think E-Collaboration Technologies help in building trust with some external partners. Using emails and GoToMeeting facilities is helpful to make decisions. So, most of the time, although we have face-to-face meetings with the graphic designer, in the beginning, we made decisions face-to-face, I have to say. So, once we have made the decision, the continuing process was done using email, etc.; maybe I would say, making a face-to-face decision is more efficient in the beginning. With the internal partnership we made decisions using electronic collaborative tools and that's fine, but with external people, probably I would prefer face-to-face meetings to make decisions…"

- Project Content Developer (University of Strathclyde)

"… In my opinion, online tools are not helping in terms of building trust. I had GoToMeeting with a couple of guys who I haven't met before, they want some input from me and I didn't feel very comfortable in the meeting and I think I would prefer sitting face-to-face. The body language of the people you are talking is important…"

- IT Project Director (Simply Collaboration)

6.6.6 Concluding remarks

CS 4 is one of the unsuccessful stories of adopting E-Collaboration Technology in a routine decision category, low level of risk and low level of urgency but involves a creative thinking decision. CS 4 has more open attitudes towards technology adoption. The team members who worked in this specific decision were the graphic designer and content developer and they are partly co-located and partly remote in location. A collaborative decision in CS 4 involved creative and artistic thinking where they are making a decision on designing the web-portal skin, including colour scheme, choosing fonts and placing the contents. This condition affects the communication preferences where they prefer both conventional and E-Collaboration Technology. CS 4 has a high impact on efficiency, but a low impact on effectiveness.

The E-Collaboration Technology was able to assist them in follow-up discussions, but not in terms of the creative decision-making process. Resulting from that, the trust development is on the Negligible (low) side as E-Collaboration Technology might not help them to conduct collaborative decision-making.

6.6.7 Key Learning Points

The following table, Table 6.5, aims to highlight the key learning points from this case study.

Table 6.5 Key learning points (CS 4)

This case identifies the impact of E-Collaboration Technologies towards…
• ***Efficiency: Positive impact.*** The impact of E-Collaboration Technologies in efficiency of collaborative decision-making in CS 4 is a Positive impact. This is because of the factors that they were adopting E-Collaboration Technology such as email as the easiest and quickest way to transfer documentations and did online voting for the project's best logo.
• ***Effectiveness: Negligible (low) impact.*** The impact of E-Collaboration Technologies in effectiveness of collaborative decision-making in CS 4 is Negligible (low) impact. This was because of the factors that collaborative decision in CS 4 requires creative and imaginative thinking during the process of decision-making. It was a complex decision that not promising to do effectively through online meeting. The face-to-face method became the preferences of key decision-makers to do collaborative decision since it allows them to do rich discussion and presenting the creative ideas.
• ***Trust development: Negligible (low) impact.*** E-Collaboration Technologies give Negligible (low) impact on trust development during the collaborative decision-making process. This was because of the complex nature of the decision itself, which was difficult to be presented and discussed online. Collaborative decision in CS 4 requires decision-makers to present their creative ideas and it includes brainstorming within the graphic designers which was not suitable to do it online. However, before the collaborative initiative started, the partners involved in

this decision had identified partner's past and current performance and confidence with the ability to produce the task as an essential factor that would increase the chances of success for collaboration initiatives

6.7 Case Study 5

6.7.1 Case Study Overview

Case Study 5 involved two collaborated partners, Simply Collaboration and the University of Strathclyde, based in the UK. Simply Collaboration is a company that is expert in designing and implementing business processes across supply chains. The University of Strathclyde, Glasgow is involved in the research part of this project, including developing engagement with all of the project's partners. CS 5 involved the IT Project Manager from Simply Collaboration and Content Project Manager I from the University of Strathclyde as they key decision-makers.

CS 5 involved a collaborative decision about developing the portal 'wheel' development. The terms 'wheel' in CS 5 refers to a graphic figure where the web portal contents are displayed nicely in the 'wheel'. It has a menu on the website to find various contents and users can use the 'wheel' to find the required information. Collaborative decision-making in CS 5 specifically dealt with the collaboration between the Project Content Developer and the Graphic Designer as well as the IT Manager who was responsible for the technical part. The communication process between the project team members in CS 5 was mainly using GoToMeeting as well as face-to-face meeting as a supplement with the internal partners. However, the face-to-face meeting has been preferable since the tasks involved in CS 5 need in-depth discussion and the key decision-makers greed that conventional method was good to cover many agendas in the meeting. For the part of trust development, the key decision-makers mentioned that it was a lot easier for them to trust the internal partner since they have the history of working together and some of other project team members had been meeting beforehand.

6.7.2 Nature and Category of Decision

CS 5 is an operational decision under Conceptual style decision-making and is categorized under Creative task types that require creative and artistic problem-solving. The collaborative decision discussed in CS 5 was about developing the graphic figure, which looks like a 'wheel' design, to make it more interactive for end users to find information in the web portal.

6.7.3 Contextual Factors

Level of risk: CS 5 is a low level of risk decision. The graphic designer responsible for delivering the concept design was an internal partner who worked with the University. In terms of relationship establishment, there was a good relationship between the project members. Their risk of making collaborative decisions upon this issue was somehow quite a smooth process where the designer executed the concept that had already been developed by the Content Project Manager and they put forward some ideas and the content manager presented these to the Technology Board. After choosing the best design for the 'wheel', the graphic designer developed it further until the end product was produced.

Level of urgency: CS 5 is a low level of urgency decision. The collaborative decision in this specific task was decided in the early phase of the project. The follow-up process was on designing the 'wheel' and putting the appropriate contents in the right place.

With regard to ***location,*** the project team members in CS 5 were remotely located across Europe except for the Content Project Manager and the Graphic Designer, who were situated in the same organisation. Most of the communication took place using GoToMeeting, email and SharePoint.

Attitudes towards technology adoption: the results of the interview show that most of the key decision-makers were comfortable with using E-Collaboration Technology as a medium of communication. This situation mostly related to the geographical dispersal among them and was in order to avoid travelling costs and time consumption.

"… The only thing we used was GoToMeeting software for communication and we do have an access to website survey tools in our SharePoint and we did use an online voting system, but the quicker and easier way to have a discussion is by the portal rather than GoToMeeting and then make an action straight away…"

- Content Project Manager (University of Strathclyde)

"… Most of the time we used Skype and GoToMeeting to communicate and make decisions about the design of the 'wheel'."

- IT Project Manager (Simply Collaboration)

6.7.4 Social Factors

With regards to the ***preferences,*** the CS 5 IT Project Manager agreed that using online technology was able to help the team members communicate very well. However, from the Content Project Manager's point of view, using online tools actually made the process complicated as it was not possible to see the people with whom they were interacting:

"… I think it will be faster with e-technology because, when people meet together, they are generally face-to-face and from the experience of this project, they generally made the decision quicker by face-to-face. I'm not sure that's necessarily a problem with the software with the fact it's online, but we have so much to cover in the agenda and we have a very short time to do it…"

- Content Project Manager (University of Strathclyde)

"… I think Skype and GoToMeeting are better because of the ability to share the screen easily…"

- IT Project Manager (Simply Collaboration)

In terms of ***trust attributes,*** most of the key decision-makers in CS 5 agreed that things that need to be focused on as trust points in the collaboration are partners' past experience as well as past performance of people and the organisation itself.

"… I think it is all about the experience you had with someone, so if someone said they are going to do something and they did it well; so you have some confidence that people are able to do that. If in the past, they may be passed the deadline and didn't complete the task properly and it's not quite what you expect, then you will be less trusting of them. In the beginning, we are all quite enthusiastic and positive about people by looking at the skill and background. So past experience is important in developing trust…"

- Content Project Manager (University of Strathclyde)

"… In this project, the most important thing is to know the partners' past performance and success or failure story. It will help in choosing the best partners…"

- IT Project Manager (Simply Collaboration)

6.7.5 Impact of Technology

With respect to ***efficiency,*** it shows that collaborative decision-making in CS 5 has a Positive impact on adopting E-Collaboration Technology. However, efficiency is applied with regard to the facilities offered by online tools; it is quicker and faster to gather people in online meetings. Since the project team members in CS 5 were remotely located, online tools were the best way to communicate.

"… I think because this project is widely distributed and we are in different locations and there are different people to make decisions so we need a consensus, so for the GoToMeeting tools, it is essential to make sure everyone knows what they need to do and why they need to do it, since that's the quickest and easiest way to get everybody together for a decision…"

- Content Project Manager (University of Strathclyde)

GoToMeeting works very well, because it works most of the time and it rather easy to use conference tools and easy to share screen…".

- IT Project Manager (Simply Collaboration)

To mention on ***effectiveness:*** the results from the interview show Negligible (low) impact on effectiveness. This condition means that adopting E-Collaboration Technology solely for collaborative decision-making was not strong enough to help the team members emerge with an effective decision. The face-to-face method is strongly helpful to support the communication and collaborative decision-making. As mentioned by the Content Project Manager II:

"… We have so much to cover in the agenda and we have a very short time to do it. When we have a face-to-face meeting we still have the agenda and deadline, but it is much easier to talk freely compared to when you are online and you maybe want to say something you won't or maybe the person who chairs the meeting won't pick up that you want to say something and it will pass quickly and it will be lost…"

- Content Project Manager (University of Strathclyde)

In relation to ***trust development,*** results from the interview show a Negligible (low) impact. The Content Project Manager II mentioned that she prefers to have the physical presence during the process of making decisions collaboratively. Since most of her tasks involve the internal graphic designer, it is possible to conduct face-to-face meetings since they are working in the same organization:

"… I think it (E-Collaboration Technologies) probably hinders trust development because you can't really get a good feel for what is going on and people maybe mis-represent it and we have experience in our project: we have persons who are quite quiet and because of not being very vocal during meetings some people make the assumption that they don't know what they are doing or they don't understand what's happening or they don't have capability to do a particular job while actually they were (just) quite quiet. So I think online tools probably hinder trust development…"

- Content Project Manager (University of Strathclyde)

The IT Project Manager has mentioned that in CS 5 there were issues around language among the Technology Board members; this is because of the multi-

cultural nature of the members involved in the collaborative project which somehow gives a Negligible (low) impact to building trust initially.

"… I think there are issues around language, because when you talk to someone who is a non-native English speaker you find most of the time, for example in Technology Board, they don't know what is happening because the project was run by native English speakers, and a lot of them are using words that are not easy to understand… so I think there are certain issues on language that avoid building initial trust and certain issues on they are not delivering what they are supposed to do…"

- IT Project Manager (Simply Collaboration)

6.7.6 Concluding remarks

CS 5 is a case that is unable to fully use the E-Collaboration Technology in the collaborative decision-making. CS 5 is a routine decision, low level of risk and low level of urgency types of decision. The collaborative decision in CS 5 involved a decision about developing an interactive figure called 'Wheel' and it was kind of an intense discussion that was unable to fully utilize E-Collaboration Technology. Face-to-face discussion was somehow needed to discuss things in-depth. The past experience and past performance of people in the organisation become factors of trust attributes before the collaborative initiative. The collaborative partners in CS 5 are partly co-located but most of them are remotely located. CS 5 has a Positive impact of technology towards efficiency, but Negligible impact in effectiveness. This condition resulted from the opportunity to have face-to-face meetings with the co-located partners, which is more effective to do face-to-face. In relation to trust development, E-Collaboration Technology gave a Negligible (low) impact and it actually hindered the trust development in CS 5.

6.7.7 Key learning points

The following table, Table 6.6, aims to highlight the key learning points from this case study.

Table 6.6 Key learning points (CS 5)

This case identifies the impact of E-Collaboration Technologies towards…
• ***Efficiency: Positive impact.*** The impact of E-Collaboration Technologies on efficiency of collaborative decision-making in CS 5 is a Positive impact. This is because of the factors that they were adopting E-Collaboration Technologies such as email and Skype to do short discussion or file transfer after the face-to-face meeting was done. It was also as a quickest way to do follow up discussion through online while face-to-face meeting require advance time to set up.
• ***Effectiveness: Negligible impact.*** The impact of E-Collaboration Technologies on effectiveness of collaborative decision-making in CS 5 is a Negligible (low) impact. This was because of the factors that collaborative decision in CS 5 requires creative and imaginative thinking along the process of decision-making which was not promising to do it via online tools. Moreover, it was easier for the decision-makers to do face-to-face meeting if required because the key decision-makers are mostly co-located in the same organisation, this condition gave advantage to do effective decision-making.
• ***Trust development: Negligible impact.*** E-Collaboration Technologies give Negligible impact on trust development during the collaborative decision-making process. This was because of the complex nature of the decision itself which was difficult to be presented and discussed online. Collaborative decision in CS 5 require decision-makers to present their creative ideas and it needs physical meeting for in-depth discussion on complex issue. Before the collaborative initiative started, the partners involved in this decision had identified partner's past and current performance and reputation in collaborative work. This was to ensure that the partners have the ability and capability to produce the task. It is an essential factors that would increase the chances of successful for collaboration initiative.

Manufacturing Supply Chain

6.8 Case Study 6

6.8.1 Case Study Overview

Case Study 6 involved collaborative partners in different departments but at the same organization, which is Highland Spring, Scotland. The collaborative partners in this case were the Finance Department and Warehouse and Distribution Department from Highland Spring itself. The key decision-maker in this case is the Customer, Supply and Logistics Manager, who is responsible for most parts of the decision, and he was the key person who was involved in engagement with the suppliers and making decisions.

CS 6 specifically involved a decision about budgeting and investment on production plant. The collaborative decision focused on investment in the production plant including factory and warehousing. The key decision-maker for this collaborative decision is a Customer Supply and Logistics Manager who is responsible for most of the decisions made in CS 6. The collaboration activities in CS 6 mainly are a cross-department collaboration, internally within the same organisation. Because of that situation, E-Collaboration Technology has been used as a method for transferring information instead of a method of communications. The E-Collaboration Technologies mainly adopted in CS 6 were the ERP system (Enterprise Resource Planning), EDI (Electronic Data Interchange) and communication through email. Enterprise Resource Planning (ERP) is business process management software that allows an organization to use a system of integrated applications to manage the business and automate back office functions. ERP software integrates all facets of an operation, including product planning, development, manufacturing processes, sales and marketing. EDI is a system that provides a technical basis for commercial "conversations" between two entities either internal or external. EDI constitutes the entire electronic data interchange paradigm, including the transmission, message flow, document format and software used to interpret the documents.

Since most of the key decision-makers in CS 6 are located in the same organisation, the face-to-face method is preferable for having a face-to-face meeting and discussion. However, they were still relying on the data extracted from the system (online tools) as a reference to carry out decision-making. In terms of trust development, it was easier since most of the team members have a history of working together in the same organisation.

6.8.2 Nature and category of decision

CS 6 is a strategic, non-routine decision under Conceptual style decision-making and is categorized under Intellective task types. The collaborative decision focused on in CS 6 was a decision about budgeting and investment on production plant including the factory and warehouse. It was an internal collaboration between different departments in the same organisation.

6.8.3 Contextual Factors

Level of risk: CS 6 is a high-risk decision where it involves investment decisions in factory and warehousing. The Finance Department and Warehouse and Distribution Department were involved in this collaborative decision. The decision is in a long-term decision category with regard to plan the future of the business.

Level of urgency: CS 6 is a high level of urgency decision. The decision taken was based on the data extracted from the systems where it is related to the decision about future demands and sales as well as production capacity for the following years. Mostly, the decision in CS 6 was made at every end of year with regard to the budget planning for the year to come.

Location: the key decision-makers for CS 6 are co-located within the same organisation. CS 6 was cross-department collaboration where different sections of the organisation worked together to achieve the common goals.

Attitudes towards technology adoption: in CS 6 different methods of communication were used. The E-Collaboration Technologies involved in CS 6 were mainly business process systems such as ERP and EDI. These technologies have been used as data input and output and not as a medium of communication. In CS 6,

collaborative decisions derived from the output via ERP, which is able to generate reports and figures to assist key decision-makers in making decisions. However, the attitudes towards using E-Collaboration Technology as a medium of communication were still ambiguous and less open between the key decision-makers, as mentioned by the Customer Supply and Logistics Manager (CSLM) in the Highland Spring:

"… A lot of complexity and unclear requirement needs to decide such as bigger plan of the project which requires discussion and things to work out and cannot just be electronic meeting whether you communicate by Skype, email or teleconferencing… of course I prefer face-to-face to discuss things…"

- CSLM (Highland Spring)

6.8.4 Social Factors

With regards to the ***preferences,*** as mentioned in attitudes towards technology adoption in one of the contextual factors earlier, the E-Collaboration Technology adopted in CS 6 was mainly used as a data-generated system and not used as a medium of communication. This condition resulted from the internal condition where CS 6 was internal collaboration between departments in the same organisation where face-to-face became the main method of communication rather than E-Collaboration Technology. However, email was extensively used in their decision-making process.

"… in my opinion, in the meeting there will be a lot of people there so you need the interaction bouncing to each other rather than cheating if doing through technology, so in that way it is easier to do face-to-face instead of (via) technology…"

- CSLM (Highland Spring)

To mention about ***trust attributes:*** the most important key trust attributes are honesty towards giving information and openness in accepting opinions, and to help to build a better relationship the team members must know each other beforehand.

"… Yes, trust is very important. It should be expected that you can't have a trusting relationship without meeting them earlier. It is about trusting the organisation on

how they gave the correct information through the system. Honesty and openness are the key to trust especially in electronic communications; honesty and openness are expected to be with you…"

- CSLM (Highland Spring)

6.8.5 Impact of Technology

With respect to ***efficiency,*** based on the interview with the Customer Supply and Logistics Manager (CSLM), E-Collaboration Technology gives a Positive impact on efficiency towards assisting collaborative decision-making. Financial data were extracted from the system itself, and it helps them to make a collaborative decision from information supplied by the system. The e-collaboration used in the CS 6 is also efficient in terms of managing a massive amount of data input derived from customers and suppliers.

"… from the business side, whether a decision to take on a new customer or making financial analysis, everything relies on information through ERP system, almost everything is driven from that…" *- CSLM (Highland Spring)*

In relation to ***effectiveness,*** ostensibly E-Collaboration Technology gives Negligible (low) impact on supporting the collaborative decision-making. The CSLM mentioned in the interview that the ERP and EDI systems were efficiently used to generate and manage extensive data and most of the time they rely on the system's report to make collaborative decisions about financial budgeting for the factory and warehouse. But in terms of communication methods such as video conferencing tool and online meeting tool, he prefers to use a conventional way (face-to-face) where it requires a lot of conversation and discussion in order to make a strategic decision.

"… It is more beneficial when doing it face-to-face when people put the point and got the point to elaborate later and it is good to have the same people at the same time. We still need the technology to give the input on information to make the basis of the decision but in term of electronic communication I don't think so…"

- CSLM (Highland Spring)

With regard to ***trust development,*** the output from the interview with the CSLM shows that E-Collaboration Technology gives a Positive impact towards trust development. E-Collaboration Technology, which in this context, is a business process tool such as EDI and ERP, allows the decision-makers in CS 6 to effective collaborative decisions and it gives a Positive impact towards trust development. Business process tools used in the decision-making have been used to get information, facts and figures, in order to assist the collaborative decision-making. They have also been used widely in other levels of business process such as ordering and supply system in operational level.

"… I think using the EDI and ERP systems kind of helps, I suppose. In the trust point of view, it is quite impressive to send the data through because of the data volume they send and it is impossible to do that manually. So having that electronically between organisations does help build trust…"

- CSLM (Highland Spring)

6.8.6 Concluding remarks

CS 6 is one of the cases in Manufacturing Supply Chain that fully utilize the E-Collaboration Technology in their strategic decision-making. The E-Collaboration Technology mentioned in this case is a business process technology, namely; EDI and ERP, which help them to generate input from the system, and not the communication technologies such as GoToMeeting and email as in CS 1 to CS 5. CS 6 is a non-routine strategic decision with a high level of risk and urgency. The collaborative decision-making involved in CS 6 was an internal collaboration where people in the same organisation, but in different departments and with different job tasks, were making a decision together to achieve a common goal. Because of the internal factor, the usage of E-Collaboration Technology as a medium of communication was less open and they prefer to have face-to-face meetings. The adoption of E-Collaboration Technology in CS 6 for getting input and output data was giving high-impact efficiency but in terms of using it as a medium of communication, its effectiveness was low impact. In terms of trust development, the key decision-maker in CS 6 agreed that using the E-Collaboration Technology such

as EDI and ERP was able to give a Positive impact in trust development, but not in terms of having an online discussion to carry out decision-making in the specific issue in CS 6.

6.8.7 Key Learning Points

The following table, Table 6.7, aims to highlight the key learning points from this case study.

Table 6.7 Key learning points (CS 6)

This case identifies the impact of E-Collaboration Technologies towards…
• ***Efficiency: Positive impact.*** The impact of E-Collaboration Technologies on efficiency of collaborative decision-making in CS 6 is a Positive impact. This was because of the factors that they were adopting E-Collaboration Technology as a medium for daily basis communication such as email, it was also been used for file transfer tool which was quick and efficient way. Moreover, the E-Collaboration Technologies adopted to assist collaborative decision-making in CS 6 were mainly EDI and ERP.
• ***Effectiveness: Negligible (low) impact.*** The impact of E-Collaboration Technologies on effectiveness of collaborative decision-making in CS 6 is Negligible (low) impact. This was because of the factors that collaborative decision in CS 6 require rich discussion on high risk decision where it involved financial planning on the organisation. Moreover, the key decision makers were located within the same organisation; in the same branch or in different branch within UK. This condition allows them to do face-to-face meeting.
• ***Trust development: Positive impact.*** E-Collaboration Technologies give Positive impact on trust development during the collaborative decision-making process. EDI and ERP tools used in the decision-making process mainly to get information, fact and figure in order to assist the collaborative decision-making. It also has been used widely in other level of business process such as order and supply system in operational level. In order to do the collaborative relationship, the partners were identifying partner's honesty, openness and meeting

partners beforehand as an essential trust attributes and factors that would increase the chances of successful for collaboration initiative.

6.9 Case Study 7

6.9.1 Case Study Overview

A collaborative decision in CS 7 involves a decision regarding distribution; location of stock, and whether to deliver to the customer or use their backhaul operation - and also the implication on the price at which the products were sold to the customer in question. The key decision-makers in this case were the Customer, Supply and Logistics Manager and the Head of Supply Chain, both are from the Highland Spring company.

6.9.2 Nature and Category of Decision

CS 7 is an operational, routine decision under Behavioural style decision-making and is categorized under Decision-making task types. The key decision-makers in CS 7 had a meeting every three months. This decision would use costing, forecast and order history data from the ERP and EDI system, and electronic communication with warehouse operators and hauliers regarding costs. The distribution team, finance and sales team would be involved with these decisions, final decision on logistics from the distribution team, on pricing the decision would be made by the sales team, informed by Finance.

6.9.3 Contextual Factors

Level of risk: CS 7 is a high level of risk decision. As mentioned by the Customer Supply and Logistics Manager (CSLM), meetings with their suppliers will take place every three months. The collaborative decision in CS 7 is a long-term strategy and to identify the direction of business-to-business between the suppliers and giving benefits to both parties. The Highland Spring retailers including key UK grocers such as Tesco, ASDA, Aldi, Sainsbury's etc.

Level of urgency: in relation to the high level of risk decision, CS 7 is a high level of urgency as well. Every three months, the team led by the Customer Supply and

Logistics Manager (CSLM) and the Head of Supply Chain will have a meeting with their customers and suppliers' representative to discuss issues that have arisen in business-to-business activities. This is to ensure that every side of collaboration will receive the latest changes and updates in their systems or working process.

Location: all customers and suppliers are remotely located across the UK.

Attitudes towards technology adoption: in CS 7 the main E-Collaboration Technologies used in order to assist the collaboration decision were ERP and EDI. Data referred from these systems helped partners to plan the strategies and improvements between the business-to-business relationships. In terms of E-Collaboration Technology for the communication part, the result shows that it was less open to adopt this kind of technology to assist collaborative decision-making.

"… I think that's probably in those cases… I don't think it works well or maybe is not accepted yet. As a business we are aware of our suppliers and customers, in some ways to use teleconferencing or whatever e-communication methods are not accepted yet and it doesn't work the same as face-to-face…"

- CSLM (Highland Spring)

"… face-to-face is more around meetings to start a process or manage issues. Face-to-face is always critical and strategically will always be required at more senior levels when communicating…"

- Head of Supply Chain (Highland Spring)

6.9.4 Social Factors

With regard to the ***preferences*** towards making collaborative decisions, the key decision makers in CS 7 are among the groups that prefer to use a conventional method, face-to-face, instead of using E-Collaboration Technology to communicate with the remotely located customers and suppliers. Since they are making a strategic decision where it involves the future of the business-to-business relationship, using teleconferencing or e-meeting facilities was not their favourite method.

"… I prefer to communicate face-to-face as I think we would choose to do more work if E-Collaboration Technologies are to apply…"

- Head of Supply Chain (Highland Spring)

"…teleconferencing or whatever and it doesn't work the same and is not accepted… so the customers and suppliers are human and they want to see you there physically, and they don't really care if you take the entire day to do it and if you have to travel down and back…"

- CSLM (Highland Spring)

In terms of ***trust attributes,*** the most important aspects that need to be considered in making a collaborative decision in CS 7 are the openness and knowing the suppliers and customers in advance. The trust attributes in CS 7 and CS 6 are the same as mentioned by the CSLM previously.

"… Yes, trust is very important. It should be expected that you can't have a trusting relationship without meeting them earlier. It is about trusting the organisation on how they gave the correct information through the system. Honesty and openness are the key to trust especially in electronic communication: honesty and openness are expected to be with you…"

- CSLM (Highland Spring)

"…trust is critical, not only in terms of giving information through the systems but also in other aspects. We need to work more closely with customers in more open and honest ways…"

- Head of Supply Chain (Highland Spring)

6.9.5 Impact of Technology

With regards to the ***efficiency,*** the adoption of E-Collaboration Technology towards assisting the key decision-makers in CS 7 resulted in giving a Positive impact of efficiency. The E-Collaboration Technology used in the day-to-day business process

had been widely used in other aspects as well. EDI and ERP systems are widely known by their competency for managing s massive amount of input and output data.

"… EDI system is the main system we used as the vast majority of our big customers and suppliers place orders through EDI; some of them have things like invoice verification by EDI and we invoice them electronically through EDI as well; it is really efficient to do it this way instead of doing it manually…"

- CSLM (Highland Spring)

"…it improves decision-making by eliminating the errors created by people inputting information wrongly, it means we can use the information more quickly and means it can be done automatically out of normal working hours…"

- Head of Supply Chain (Highland Spring)

In relation to ***effectiveness,*** seemingly E-Collaboration Technology has a Negligible (low) impact on supporting the collaborative decision-making. As mentioned in the attitudes towards technology adoption, the conventional way like face-to-face was more favoured than using E-Collaboration Technology, as mentioned by the Customer Supply and Logistics Manager:

"… the customers and suppliers are human and they want to see you there physically, and they don't really care if you take the entire day to do it or if you have to travel down and back. I'm sure some of them are aware of the time element but I don't think having a phone or video conference has the same effect to them. I don't think is easy to adopt, so, it is easier to do it the face-to-face way…"

- CSLM (Highland Spring)

" …when dealing with grocers around planning and our production, there is always a need to apply logic and common sense, the information from the systems should always be used as a guide. Face-to-face way was the best options to do effective decisions.

With regard to ***trust development,*** the output from the interviewees shows that E-Collaboration Technology gives a Negligible (low) impact towards trust development. The Customer, Service and Logistics Manager as well as the Head of Supply Chain did mention this situation comes from the experience when they face the difficulty with the supplier who is changing their way of working and all the technology they are using does not use the same process as before. This condition had affected the whole process of the business operations.

"… one of our suppliers has changed their methods of EDI, they deal by a day-to-day basis system, they have been quite demanding and we can't comply with that, since a lot of testing is involved and a lot of overheads have to be involved in doing it. So it's probably not a lot of trust there. That's not creating understanding, it is very much of a big stake approach that you have to do it and give benefits other than long-term business…"

- CSLM (Highland Spring)

It was also an issue around openness and honesty as mentioned by the Head of Supply Chains:

" … an example was where I was reluctant to tell the Company A about a plan I had that could save both business's £400,000 each and we both stuck to our deals. I offered the savings honestly and openly but it was not successful. I eventually approached the Strategy Manager at company B and everything was fine and we did the decision-making face-to-face. Being honest and trusting is critical…"

- Head of Supply Chain (Highland Spring)

6.9.6 Concluding remarks

CS 7 is one of the cases that disagree with the adoption of E-Collaboration Technology in their strategic routine decision with a high level of risk and urgency. The decision in CS 7 involved customers and suppliers who were less open to using E-Collaboration Technology as a medium of communication, and they are willing to travel back and forth just to have a physical presence in meetings in terms of the satisfaction of making a strategic decision. The E-Collaboration Technology as a

business process tools, such as EDI and ERP, was widely used as a data-generated purpose to assist the decision-making, based on facts and figures only, but not in terms of use as a communication technology base. CS 7 gave a Positive impact on efficiency but a Negligible (low) impact on effectiveness; therefore the trust development was on the Negligible (low) side. The key decision-makers did not agree that using E-Collaboration Technologies were able to assist them as a medium of communication in making strategic decisions, it can only be used for getting the facts and figures from the data.

6.9.7 Key Learning Points

The following table, Table 6.8, aims to highlight the key learning points from this case study.

Table 6.8 Key learning points (CS 7)

This case identifies the impact of E-Collaboration Technologies towards…
• ***Efficiency: Positive impact.*** The impact of E-Collaboration Technologies on efficiency of collaborative decision-making in CS 7 is a Positive impact. This is because of the factors that they were adopting E-Collaboration Technology as a medium for daily basis communication such as email, it was also been used for file transfer tool between the customers and suppliers which was quick and efficient way. Moreover, in the context of CS 7, the E-Collaboration Technology adopted to assist collaborative decision-making were EDI and ERP system where it was extensively used to extract information, fact and figures. It also able to improves decision-making by eliminating the errors created by people in putting wrong information. There are the only main systems that supplied information, facts and figures to the key decision- makers involved in collaborative decision in CS 7.
• ***Effectiveness: Negligible impact.*** The impact of E-Collaboration Technologies on effectiveness of collaborative decision-making in CS 7 is Negligible (low) impact. This was because of the factors that collaborative decision in CS 7 is a Behavioural style decision-making, requires

richness in discussion and a lot of documentations involved during the meeting. This was not promising to do via online, while face-to-face meeting was more favourable even though the suppliers and customers were remotely located.

- ***Trust development: Negligible impact.***
  E-Collaboration Technologies give a Negligible (low) impact towards trust development during the collaborative decision-making process. This situation comes from the experience when they face the difficulty with the supplier who changed their way of working order and all the technologies they were using did not use the same process as before. This condition had affected the whole process of the business operations and delayed the decision-making process. In order to do the collaborative relationship, the partners were identifying partner's honesty, openness and meeting partners beforehand as an essential trust attributes and factors that would increase the chances of successful for collaboration initiative.

6.10 Case Study 8

6.10.1 Case Study Overview

A collaborative decision involved in CS 8 were related to decision on how to meet orders when exceptional volumes were ordered by customers. The internal collaboration would be between the customer service team, planning team and sales team. The key decision-makers in this case were the Customer, Supply and Logistics Manager and the Demand Manager, both are from the Highland Spring company.

The collaborative decision focused on managing the order requests extracted from the ERP system would include stock levels, recent order history and sales forecast, and data relating to the next planned production timing and volume. The sales orders would be imported via EDI into the ERP system. They received the orders electronically using the EDI system and some customers place orders via email and fax. CS 8 is a decision that fully relies on the information they obtained from the EDI and ERP systems and they make their decisions accordingly. In terms of communication technologies adopted in CS 8, it was mainly using the basic methods

such as email, fax and telephone and the preference for the E-Collaboration Technology methods was high as most of the partners are remotely located.

6.10.2 Nature and Category of Decision

CS 8 is an operational, non-routine decision under Directive style decision-making and is categorized under Decision-making task types. It was a day-to-day process of getting ordering from customers through the EDI system. The EDI system was the main system used in CS 8 and some of their customers have invoice verification through EDI and were invoiced electronically from the system as well, while every transaction and business process was operated through the ERP system and order processing system.

6.10.3 Contextual Factors

Level of risk: CS 8 is a high level of decision category. It is a routine, day-to-day and daily basis activity which requires a lot of data extraction and reports from the systems. CS 8 also involves a lot of financial transactions underneath the orders made by the customers, which at some points are worth millions of pounds.

Level of urgency: since the activity of CS 8 is a daily basis activity, it is a high level of urgency decision. The team who handles the system takes the order, then processes it and handles it every day until the orders reaches it reaches the customer's demand.

Location: all customers are remotely located across the UK and some of them are in Europe.

Attitudes towards technology adoption: the teams who handle the ordering process are fully occupied with the EDI and ERP system. Before they get involved in the system, they need to go through some training in order to make sure they know the flow of the system and how to handle the data input and output from the system. The attitudes towards technology adoption are more open in CS 8.

"… there is a team to look at that and they are fully trained to use the system. It involves every side of the systems including financial system, marketing, order processing, supply chain, material planning… everything is done through the ERP

system all the time and everybody in the team is working directly to extract information from the system…"

- CSLM (Highland Spring)

"… we communicate with our customers especially in retail using EDI, this is how we receive orders and also how we send information out to our warehouses…"

- Demand Manager (Highland Spring)

6.10.4 Social Factors

With regards to the ***preferences*** towards making collaborative decisions, the key decision-makers in CS 8 agreed that using the e-collaboration system, namely; EDI and ERP, is preferable since all the business activities rely on the information extracted from the system itself.

"… based from the data underpinned the fact and from the business side whether operations to take new customers, making financial analysis and volume done from the information through ERP and EDI and almost everything driven from the system…"

- CSLM (Highland Spring)

" … there are times where each (E-Collaboration Technologies and Face-to-face) is effective, however today I believe the Technology will take over…"

- Demand Manager (Highland Spring)

Trust attributes: in CS 8, the most important aspect in building up the trust attributes is honesty. Honesty in this specific situation means the correct method of putting information onto the system and the ability to put valid and correct information onto the system. It is all about trusting the people who handle the system in the organisation.

"… it is about trusting the organisation on how they gave the correct information though the system…"

- CSLM (Highland Spring)

" … trust is prerequisite in collaboration, internal or external. You need to put a lot of trust to the organization in order to create a successful collaboration…"

- Demand Manager (Highland Spring)

6.10.5 Impact of Technology

With regard to ***efficiency,*** E-Collaboration Technology used in CS 8, namely; EDI and ERP, plays a vital role in the day-to-day business process. It gives a Positive impact on efficiency towards handling the massive amount of data and information.

"… long-term and day-to-day process are allocated and assigned to the operational team. The orders and destination that we need to collect for tomorrow's delivery and the next day are then up to the operational team to use the information to manage the product delivery. All information is generated from the system electronically. So it's kind of speeding up the process as they put it up directly into their planning system…"

- CSLM (Highland Spring)

" … EDI and ERP are efficient to handle large amount of data. The systems' ability and capability able to help us to manage extensive amount of orders…"

- Demand Manager (Highland Spring)

In the context of ***effectiveness,*** E-Collaboration Technology gives a Positive impact for the effectiveness context. The data extracted from the system is the main source of getting the order request from customers. However, sometimes there is a technical issues involved with the system as it does not work perfectly. In CS 8, as a successful implementation, they migrated from the old system to a new one, which works more perfectly and effectively.

"… as a successful implementation to make the system more effective, we went from the old system to a new one to capture order and production. There are a lot of coaches and we did training for every team and it is not easy to give training to

people to change from what they did before and this is what you need to do now. However, it works perfectly and effectively in this case…"

- CSLM (Highland Spring)

" EDI and ERP are the systems that able to provide correct yet accurate information. The systems able to assist decision-makers to make decision based on the information provided. Our business relies totally on our core system…"

- Demand Manager (Highland Spring)

With regard to ***trust development,*** E-Collaboration Technology adopted in CS 8, namely; EDI and ERP, gives a Positive impact for trust development. This condition resulted from the awareness of the customer's working system and the background of the system that they used themselves. The system has its own security feature related to its data input and output.

"… in the trust point of view, it is quite impressive to send the data through because of the volume of data they can send and it is impossible to do that manually. So having that electronically between organisations does help in building trust; we did that back and forth and that's great. I think trust is a prerequisite for it as the system works by sending different information…"

- CSLM (Highland Spring)

" … using EDI and ERP systems actually able to build trust between organization. This is because of the correct and accurate information that we got from the customers, not only in order request but also in payment process. Most important trust attributes are honesty.."

- Demand Manager (Highland Spring)

6.10.6 Concluding remarks

CS 8 is one of the cases in routine decision for operational category with a high level of risk and urgency. The E-Collaboration Technologies adopted in CS 8 were mainly EDI for getting an order request and processing tools and the ERP system to

communicate and obtain data, facts and figures from their customers. In terms of using E-Collaboration Technology as a medium of getting the order request and processing, the team in CS 8 was fully trained with the system features and they are more open to use the system in operational activities. CS 8 acquired a high impact on efficiency and a high impact on effectiveness with trust development in the positive side; at the same time it shows that the E-Collaboration Technology as a business process tool, namely; EDI and ERP, was able to help them in collaborative decision-making.

6.10.7 Key learning points

The following table, Table 6.9, aims to highlight the key learning points from this case study.

Table 6.9 Key learning points (CS 8)

This case identifies the impact of E-Collaboration Technologies towards…
• ***Efficiency: Positive impact.*** The impact of E-Collaboration Technologies on efficiency of collaborative decision-making in CS 8 is a Positive impact. This is because of the factors that they were adopting E-Collaboration Technology as a medium of daily basis communication such as email as well as tools for transferring file. In terms of E-Collaboration Technologies in the context of business process tool; ERP and EDI were helpful to decision-makers to get accurate information, facts and figures in order to assist them to do collaborative decision-making.
• ***Effectiveness: Positive impact.*** The impact of E-Collaboration Technologies on effectiveness of collaborative decision-making in CS 8 is a Positive impact. This was because of the factors that collaborative decision in CS 8 is a Directive Style decision, where it was totally rely on the information extract from the EDI and ERP system to assist collaborative decision-making. It was a direct and quick decision that derived from the information generated from the ERP and EDI system.

- ***Trust development: Positive impact.***

  E-Collaboration Technologies give Positive impact on trust development during the collaborative decision-making process. This was because of order request and process data from customers and suppliers were directly extract from the system, it was the main system used assist decision-making at operational level in CS 8. Customers and suppliers were also using the same standard systems. In order to build the collaboration with customers and suppliers, the key decision-makers had identified partner's honesty in terms of getting and putting the right and valid information in the system as an essential factors that would increase the chances of success for collaboration initiative.

6.11 Summary

The aim of this chapter is to demonstrate the within-case analysis for each case. This chapter has dealt with a large amount of qualitative data gathered from eight case studies investigated in this research. The chapter aimed at conducting within-case analysis for the Service Supply Chain and Manufacturing Supply Chain areas. The analyses started with the narrative discussion for each cases followed by concluding remarks and ended up with key learning points to depict the relations between the different factors that affect the collaborative decision-making. Table 6.10 displays the summary of within-case inter-relationship table for each cases.

The next chapter aims to conduct cross-case analysis of the examined cases in order to organize and make sense of this research data; hence allowing for the provision of answers to the research questions.

Table 6.10 Within case inter-relationship table for each case

SERVICE SUPPLY CHAIN				CONTEXTUAL FACTORS				SOCIAL FACTORS		IMPACT OF TECHNOLOGY ADOPTION		
Case Study	**Introduction**	**Types of decision**	**Decision category**	**Level of risk**	**Level of Urgency**	**Attitudes towards tech. adoption**	**Location**	**Preferences**	**Trust Attributes**	**Efficiency**	**Effectiveness**	**Trust development**
CS 1	Decision about eliminating the non-performing partner in the collaborative initiatives.	Strategic, non-routine: Non-performing partner	Conceptual (cognitive conflict)	High	High	More open	Remote	E-Technology & Face-to-face	Partner's performance, knowing each other beforehand	Positive	Positive	Positive
CS 2	Decision about the application development and to decide on the best placement of the portal's contents.	Operational, non-routine: Dev. of 'Adaptive Capability Model'	Beha-vioural (Intel-lective)	Low	Low	More open	Remote	E-Technology & Face-to-face	Past and current partner's performance	Positive	Positive	Positive
CS 3	Decision about changing the portal platform from 'Druple' software to 'Sitefinity' because of compatibility issue.	Strategic, non-routine: Choosing 'Sitefinity' as portal platform	Analytical (decision-making)	High	High	More open	Remote	Face-to-face	Past and current partner's performance	Positive	Negligible	Negligible
CS 4	Decision about choosing the most suitable logo and portal design.	Strategic, non-routine: Website & logo design	Conceptual (creative/ artistic)	Low	Low	More open	Remote	E-Technology & Face-to-face	Ability to produce the task, past performance	Positive	Negligible	Negligible
CS 5	Decision about developing the 'Wheel' including content and design.	Strategic, non-routine: Development of portal 'Wheel' design	Conceptual (creative/ artistic)	Low	Low	More open	Remote	E-Technology & Face-to-face	Past experience, past performance of people and organisation	Positive	Negligible	Negligible

MANUFACTURING SUPPLY CHAIN				CONTEXTUAL FACTORS				SOCIAL FACTORS		IMPACT OF TECHNOLOGY ADOPTION		
Case Study	**Introduction**	**Types of decision**	**Decision style**	**Level of risk**	**Level of Urgency**	**Attitudes towards tech. adoption**	**Location**	**Preferences**	**Trust Attributes**	**Efficiency**	**Effectiveness**	**Trust development**
CS 6	Decision about budget locating on production plant.	Strategic, non-routine: Investment on production plant (factory & warehouse)	Conceptual (Intel-lective)	High	High	Less open	Co-located	Face-to-face	Honesty, openness, meeting beforehand	Positive	Negligible	Positive
CS 7	Decision about distributing product to suppliers.	Operational, routine: Product distribution	Behaviour-al (Decision-making)	High	High	Less open	Remote	Face-to-face	Meeting beforehand, openness	Positive	Negligible	Negligible
CS 8	Decision about handling and processing the big amount of order request from customers.	Operational, routine: Order request & processing	Directive (Decision-making)	High	High	More open	Remote	E- Technology	Honesty	Positive	Positive	Positive

CHAPTER 7

EMPIRICAL FINDINGS (CROSS-CASE ANALYSIS)

7.1 Cross-case Analysis

In order to find the similarities and different patterns of the examined cases, the researcher applied a systematic search for cross-case patterns as a key step in the case study research. It is essential for enhancing the generalizability of conclusions drawn from the cases (Voss, Tsikriktsis, & Frohlich, 2002). The aim of this chapter is to explore where the multiple cases are diverging or converging as well as finding out the comparison between emerging patterns in the manufacturing supply chain and service supply chain with regard to the impact of E-Collaboration Technologies on the effectiveness and efficiency of collaborative decision-making.

In order to achieve the above objectives, the researcher will compare and contrast the cases versus research questions and the conceptual framework developed through a review of literature (Chapter 2 and Chapter 3). The cross-case analysis involved in Chapter 7 is to answer Research Questions 2 and 3, while Research Question 1 has been answered in Chapter 3.

To answer RQ 2 (RQ 2.1 and RQ 2.2) and RQ 3 the researcher developed an analysis table derived from the key learning points tables (Tables 6.2 - 6.9) developed in Chapter 6, which provides the summary for the impact of E-Collaboration Technologies on efficiency, effectiveness and trust development of collaborative decision-making together with their contribution factors.

The updated conceptual framework presented at the end of this chapter resulted from the key learning points tables as in Chapter 6 and the summary of the pattern analysis tables that are to be addressed in this chapter. Figure 7.1 depicted the steps undertaken in cross-case analysis for this research.

During the within-case analysis, there were three steps taken to complete the process of analysis. The cases were then further analyzed in cross-case analysis with the

purpose of reaching the conclusion of the findings. Tables of pattern analysis were then Tables of pattern analysis were then developed in order to answer the research questions 2.1, 2.2 and 3. The next step was to summarize the findings from the pattern analysis to the table of answer to the research question. The final step was to update the developed framework based on the findings from the cross-case analysis.

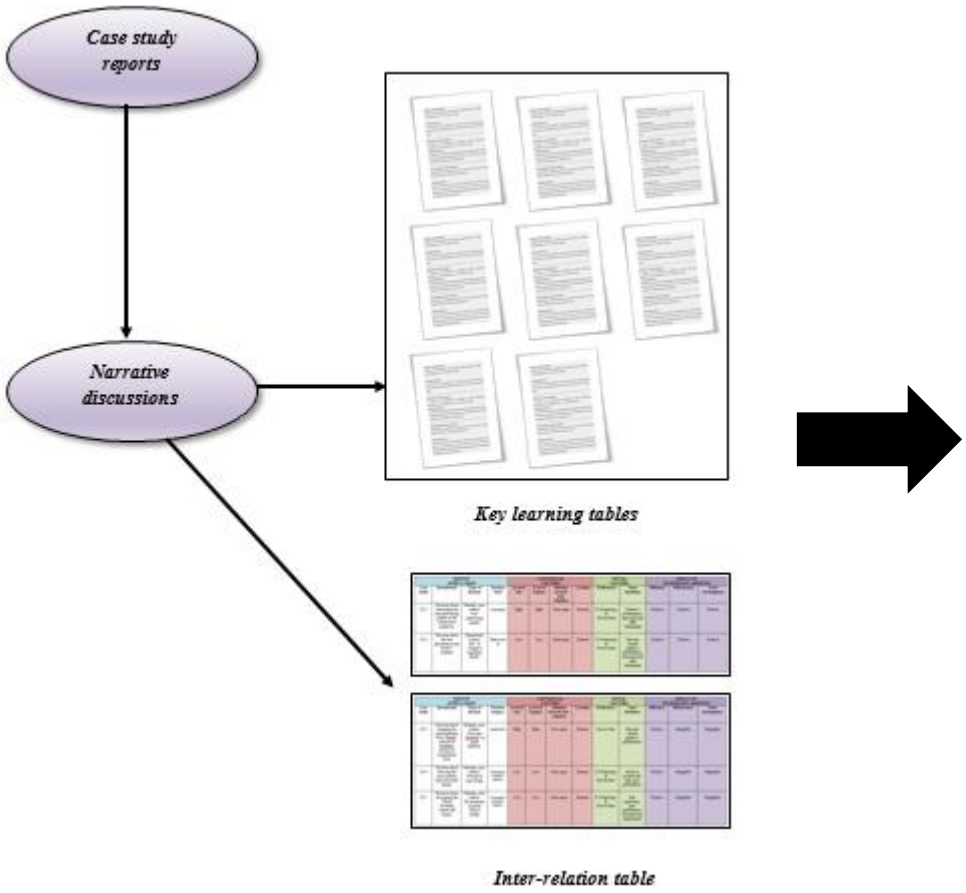


Figure 7.1 Steps undertaken in cross-case analysis

7.2 Answer to Research Question 2

The purpose of Research Question 2 is to identify the impact of E-Collaboration Technologies on efficiency and effectiveness of collaborative decision-making. The definitions of efficiency and effectiveness used in this research, derived from definition from *Oxford Dictionary online (*http://www.oxforddictionaries.com/), are as follow:

Efficient definition:

Adjective

- 1 (of a system or machine) achieving maximum productivity with minimum wasted effort or expense.
- 2 (of a person) working in a well-organized and competent way.

Noun

- The state or quality of being efficient.

Effective definition:

Adjective

- Successful in producing a desired or intended result.

Noun

- The degree to which something is successful in producing a desired result; success.

This question has been answered by identifying the task types and decision-making style of the collaborative decisions, and the impact of E-Collaboration Technologies on efficiency and effectiveness during the collaborative decision-making process and their contributory factors towards the impact.

During the exploration in the literature review (Chapter 2), the researcher was able to identify three main factors that attained the adoption of E-collaboration Technologies during the process of decision-making: they are *Contextual Factors*, which consist of

level of risk, level of urgency and attitudes towards Technologies adoption; *Social Factors*, which consist of preferences and trust attributes; and *Impact of Technologies*, which consist of efficiency, effectiveness and trust development. The literature identified these factors as theoretically-valid constructs besides identifying that they are inter-related with each other in order to measure the performance evaluation methods (Chebil, Chaari, & Cerri, 2011).

The Research Question 2 is:

RQ 2: How do E-Collaboration Technologies enable collaborative decision-making in:

RQ 2.1 - Service Supply Chain?

RQ 2.2 - Manufacturing Supply Chain?

The following table (Table 7.1) shows the pattern across cases of the impact of E-Collaboration Technologies on efficiency and effectiveness of collaboration decision-making in Service Supply Chain.

Table 7.1 To answer RQ 2.1 – Service Supply Chain					
CASE STUDY	**CS 1**	**CS 2**	**CS 3**	**CS 4**	**CS 5**
The decision background…	Decision on eliminating the non-performing partner.	Decision on development of 'Adaptive Capability Model'	Decision on changing the portal platform.	Decision on development of website logo and design.	Decision on development of portal 'Wheel' design.
The decision profile…	• The **STRATEGIC** decision is categorized under non-routine decision. • Types of collaborative decision involved in CS 1 was under **CONCEPTUAL STYLE decision-making.** • Decision category: **NEGOTIATE – Cognitive Conflict Task Type.**	• The **OPERATIONAL** decision is categorized under routine decision. • Types of collaborative decision involved in CS 2 was under **BEHAVIOURAL STYLE decision-making.** • Decision category: **CHOOSE – Intellective Task Type.**	• The **STRATEGIC** decision is categorized under non-routine decision. • Types of collaborative decision involved in CS 3 was under **ANALYTICAL STYLE decision-making** • Decision category: **CHOOSE – Decision-making Task Type.**	• The **STRATEGIC** decision is categorized under non-routine decision. • Types of collaborative decision involved in CS 4 was under **CONCEPTUAL STYLE decision-making**. • Decision category: **GENERATE – Planning Task Type.**	• The **STRATEGIC** decision is categorized under routine decision. • Types of collaborative decision involved in CS 5 was under **CONCEPTUAL STYLE decision-making**. • Decision category: **GENERATE – Creative Task Type.**
This case identifies…	• **The POSITIVE** impact towards **EFFICIENCY of collaborative decision-making** was achieved in adoption of E-Collaboration Technologies during the collaborative decision-making process **in CS 1 to CS 5.**				
This case identifies…	• **The POSITIVE** impact towards **EFFECTIVENESS of collaborative decision-making** was achieved in adoption of E-Collaboration Technologies during the collaborative decision-making process **in CS1 and CS 2.**		• **NEGLIGIBLE** (low) impact towards **EFFECTIVENESS of collaborative decision-making** was achieved in adoption of E-Collaboration Technologies during the collaborative decision-making process **in CS 3, CS 4 and CS 5.**		

7.2.1 Answer to RQ 2.1 - Service Supply Chain

The previous table (Table 7.1) shows the pattern across cases in Service Supply Chain regarding the impact of E-Collaboration Technologies on efficiency and effectiveness of collaborative decision-making in Service Supply Chain.

The first step to answer research question 2.1 is to look at the patterns that occurred in type of decision (Strategic or Operational), the decision-making styles *(Conceptual, Behavioural or Analytical)* and the task types *(Negotiate, Choose or Generate).* The strategic decisions in all cases are under non-routine types of decision and this supports the findings from literature about the Category I and Category II decisions (Simon, 1987).

The second step to answer research question 2.1 is to look at the patterns that arose in the impact of E-Collaboration Technologies on efficiency and effectiveness of collaborative decision-making. As we can see in Table 7.1, a Positive impact on efficiency was achieved in adoption of E-collaboration Technologies during the collaborative decision-making process. This applied in all types of decisions (Strategic or Operational) and decision styles. The findings from the cases conclude that the impact of E-Collaboration Technologies on efficiency of collaborative decision-making is not contingent upon any type of decision-making level, whether it is Strategic or Operational, or upon any types of decision-making style. The E-Collaboration Technologies enable the decision-maker to carry out efficient collaborative decision-making.

The third step to answer research question 2.1 is to identify the patterns that surrounded the impact of E-Collaboration Technologies on effectiveness of collaborative decision-making. In Table 7.1, we can see that CS 1 and CS 2 resulted in a Positive impact on effectiveness in adoption of E-Collaboration Technologies during the collaborative decision-making process. CS 1 was a Conceptual Style decision-making and under Negotiate (Cognitive Conflict task type) decision category while CS 2 was a Behavioural Style decision-making and under Choose (Intellective task type) decision category.

There are some factors that contribute to the Positive impact on effectiveness of collaborative decision-making in these two cases. The nature of the collaborative decisions was somehow ***complex***, the issue that arose in this decision needed in-depth discussion and evaluation of many possible solutions before the final decision was made. The remote location between the key decision-makers was one of the contextual factors that made the E-Collaboration Technologies give a Positive impact on the effectiveness of the decision-making. The quickest and easiest way to get the key decision-makers together is by having an online meeting with face-to-face meeting as a supplementing way.

Meanwhile, similar patterns were realized across three other cases (CS 3, CS 4 and CS 5) regarding the Negligible (low) impact of E-Collaboration Technologies on effectiveness of collaborative decision-making. This was reflected in the nature of the decision where complexity and creativity in making the decision are needed. CS 3 was an Analytical style decision-making. The background of the decision was very ***complex*** (refer to Chapter 6) where it involved technical parts of the system development. The adoption of E-Collaboration Technologies somehow was not helpful in the collaborative decision-making process even though the key decision-makers are remotely located across the UK. It required technical skill and ability to solve the problem where doing it online was not promising. CS 4 and CS 5 involved Conceptual style decision-making where it involves the creative and artistic decision category, and the Negligible (lower) impact of effectiveness on collaborative decision-making was achieved in adoption of E-Collaboration Technologies. The creative task could not be achieved through adoption of E-Collaboration Technologies because it was difficult to adapt the imaginary task during the decision-making process.

The findings from the cases conclude that the impact of E-Collaboration Technologies on effectiveness of collaborative decision-making is contingent upon the types of decision and the decision styles; whether they are complex in nature, involve technical capability or are creative-minded decisions.

As a result, the answer to Research Question 2.1 would be as follows:

The Positive impact of E-Collaboration Technologies on efficiency of collaborative decision-making is not contingent upon any types of collaborative decision (Strategic or Operational), decision styles or the task types.

The Positive impact of E-Collaboration Technologies on effectiveness of collaborative decision-making is contingent upon the decision styles and the task types. ***E-Collaboration Technologies give a Positive impact on Conceptual Style decision-making (under Cognitive Conflict Task Type) and Behavioural Style decision-making (under Intellective Task Type).***

A Conceptual Style decision-making usually involves complex situations and an environment with a high level of risk, while a Behavioural Style decision requires rich information and discussion before coming to the final decision. The E-Collaboration Technologies enable collaborative decision-making for these type of decisions.

The impact of E-Collaboration Technologies is Negligible (low impact) *when the collaborative decision-making involves* ***Analytical Style decision-making (under Decision-making Task Type) and Conceptual Style (under Planning Task Type and Creative Task Type).***

An Analytical Style decision usually involves complex situations and an environment with a high level of risk; it also requires special attention from the specialists among the key decision-makers who have the technical ability to find the best solution for the problem. Conceptual Style decision-making that involves creative and artistic problem-solving usually occurs in much simpler situations, but can be in complex situations as well. A simple decision usually involves low risk and low urgency during the decision-making process and there may be several possible ways to solve the problems, which will be driven the decision-making. The E-Collaboration Technologies did not support the collaborative decision-making for these types of decisions.

Table 7.2 summarizes the answer for RQ 2.1 as below:

Table 7.2 Summary to answer RQ 2.1

RQ 2.1: How does E-Collaboration Technologies enable collaborative decision-making in Service Supply Chain?	
E-Collaboration Technologies give **POSITIVE** impact on:	
What?	*Efficiency of...* *Any types of collaborative decisions. It is not contingent upon any types of collaborative decisions (Strategic or Operational), decision styles and the task types.* *Effectiveness of…* *Conceptual Style decision-making (under Cognitive Conflict Task Type) and Behavioural Style decision-making (under Intellective Task Type).*
How?	1. *Conceptual Style (under Cognitive Conflict Task Type) characteristics:* • *Involves complex situations and environment.* • *High level of risk.* 2. *Behavioural Style (under Intellective Task Type) characteristics:* • *Requires rich information and discussion before coming to the final decision.*
E-Collaboration Technologies give **NEGLIGIBLE (LOW)** impact on:	
What?	*Effectiveness of…* *Analytical Style decision-making (under Decision-making Task Type) and Conceptual Style (under Planning Task Type and Creative Task Type).*
How?	3. *Analytical Style (under Decision-making Task Type) Characteristics:* • *Involves complex situations and environment.* • *High level of risk.* • *Require special attention from the specialist who have the technical ability to find the best solution for the problem.* 4. *Conceptual Style (under Planning Task Type and Creative Task Type) Characteristics:* • *Involved creative and artistic problem solving.* • *Usually occurred in much simpler or can be in complex situation as well.* • *Low risk and low urgency.* • *It may has several possible way to solve the problems which will be driven the decision-making.*

Table 7.3 To answer RQ 2.2 – Manufacturing Supply Chain			
CASE STUDY	**CS 6**	**CS 7**	**CS 8**
The decision background…	Decision on investment on production plant (Factory & warehouse).	Decision on products distribution.	Decision on order request and processing.
The decision profile…	• The **STRATEGIC** decision is categorized under non-routine decision. • Types of collaborative decision involved in CS 6 was a **CONCEPTUAL STYLE decision-making**. • Decision category**: CHOOSE – Intellective Task Type.**	• The **OPERATIONAL** decision is categorized under routine decision. • Types of collaborative decision involved in CS 7 was a **BEHAVIOURAL STYLE decision-making.** • Decision category: **CHOOSE – Decision-making Task Type.**	• The **OPERATIONAL** decision is categorized under routine decision. • Types of collaborative decision involved in CS 8 was a **DIRECTIVE STYLE decision-making**. • Decision category: **CHOOSE – Decision-making Task Type.**
This case identifies…	• **The POSITIVE** impact towards **EFFICIENCY of collaborative decision-making** was achieved in adoption of E-Collaboration Technologies during the collaborative decision-making process **in CS 6 to CS 8.**		
This case identifies…	• **NEGLIGIBLE** (low) impact towards **EFFECTIVENESS of collaborative decision-making** was achieved in adoption of E-Collaboration Technologies during the collaborative decision-making process **in CS 6 and CS 7.**		• **POSITIVE** impact towards **EFFECTIVENESS of collaborative decision-making** was achieved in adoption of E-Collaboration Technologies during the collaborative decision-making process **in CS 8.**

7.2.2 Answer to RQ 2.2 - Manufacturing Supply Chain

The following table (Table 7.4) shows the pattern across cases in Manufacturing Supply Chain regarding the impact of E-Collaboration Technologies on efficiency and effectiveness of collaborative decision-making in Manufacturing Supply Chain.

The first step to answer research question 2.2 is to look at the patterns that occurred in type of decision (Strategic or Operational) and the decision-making styles *(Conceptual, Behavioural, Analytical or Creative decision).* The strategic decisions in all cases are under non-routine types of decision and this supports the findings from literature about the Category I and Category II decisions (Simon, 1987).

The second step to answer research question 2.2 is to look at the patterns that arose in the impact of E-Collaboration Technologies on efficiency and effectiveness of collaborative decision-making. As we can see in Table 7.3 the Positive impact on efficiency of collaborative decision-making was achieved in adoption of E-collaboration Technologies during the collaborative decision-making process. This applied in all types of decisions (Strategic or Operational) and decision-making styles. The findings from the cases concluded that the impact of E-Collaboration Technologies in manufacturing, such as ERP and EDI, on efficiency of collaborative decision-making is not contingent upon any types of collaborative decision whether at the Strategic or Operational level and is also not contingent upon any types of decision-making style. The E-Collaboration Technologies enable the decision-maker to make efficient collaborative decision-making.

The third step to answer research question 2.2 is to identify the patterns that surrounded the impact of E-Collaboration Technologies on effectiveness of collaborative decision-making. In Table 7.2, we can see that CS 6 and CS 7 resulted in a Negligible (low) impact on effectiveness in adoption of E-Collaboration Technologies during the collaborative decision-making process. Looking in-depth at types of decision and decision categories of CS 6 and CS 7 we can see that CS 6 was a Conceptual Style decision-making and under Choose (Intellective task type) decision category while CS 7 was a Behavioural Style decision-making and under Choose (Decision-making task type).

There are some factors that contribute to the Negligible (low) impact on effectiveness of collaborative decision-making in these two cases. This was because collaborative decisions require rich discussion on a high-risk decision where it involves financial planning in the organization. These decisions depended on the information given by the ERP and EDI systems to assist the decision-making, but in order to make the final decision, the decision-makers were willing to do it face-to-face as this will give richer information and discussion towards the decision-making process. As in CS 6, the nature of the collaborative decision background involved a financial decision where it was a ***complex*** decision in nature. Moreover, the collaborative partners who were responsible as the key decision-makers are co-located in the same organization but within different departments in some branches. The impact of adopting E-Collaboration Technologies on effectiveness in collaborative decision-making was somehow Negligible in this specific decision. As in CS7, the nature of the collaborative decision background was somehow ***complex*** and more descriptive discussions with the customers and suppliers were required. The tasks involved in the collaborative decision in CS 7 required richer information and a lot of documents were involved during the collaborative decision-making process. For this reason, the impact of adopting E-Collaboration Technologies on effectiveness of collaborative decision-making was somehow Negligible even though the key decision-makers are remotely located across the UK.

Meanwhile, the impact given by E-Collaboration Technologies on effectiveness of collaborative decision-making in CS 8 was a Positive impact. The decision-making style involved in CS 8 was a Directive Style where key decision-makers were fully reliant on the information extracted from the business process tools ERP and EDI. Sufficient information provided by the systems was able to assist decision-makers to make the final decision, which required logical thinking derived from the information, facts and figures that were extracted from the system.

As in CS 8 the higher impact on effectiveness of collaborative decision-making in adoption of E-Collaboration Technologies was found in CS 8. This was reflected in the nature of the decision where it was a ***simple and direct decision*** about order requests from customers and suppliers and they were fully operated through ERP and

EDI business process systems. This specific decision was fully reliant on the E-Collaboration Technologies for the manufacturing system and it was a routine, daily basis type of decision. It did not need much additional information and discussion as it was based on logical thinking from the information, facts and figures extracted from the system.

The findings from the cases in Manufacturing Supply Chain conclude that the impact of E-Collaboration Technologies on effectiveness is contingent upon the style of decision, whether it was Conceptual, Behavioural or Directive Style decision-making, and whether it was complex in nature or simple and direct with full reliance on the data input and output of the system to gain information and to make the decision.

As a result, the answer to Research Question 2.2 would be as follows:

The Positive impact of E-Collaboration Technologies on efficiency of collaborative decision-making is not contingent upon any types of collaborative decision (Strategic or Operational), decision styles or the task types.

The Positive impact of E-Collaboration Technologies on effectiveness of collaborative decision-making is contingent upon the decision styles and the task types. ***E-Collaboration Technologies give a Positive impact on Directive Style decision-making (under Choose: Decision-making Task Type).*** *A Directive Style decision-making involves rich information and various possible solutions for the decision-making. Usually, Directive Style decision-making requires only a small amount possible of information to assist the decision-making process. The operational level in manufacturing involves adoption of business process systems such as ERP and EDI where all sorts of data input from customers and suppliers become the source of information. The E-Collaboration Technologies are able to assist Directive Style decisions when the system is fully utilized and becomes the main source of information during the decision-making process. The E-Collaboration Technologies enable collaborative decision-making for these type of decisions.*

The impact of E-Collaboration Technologies is a Negligible (low impact) *when the collaborative decision-making involves* ***Conceptual Style decision-making (under Choose: Intellective Task Type) and Behavioural Style decision-making (under Choose: Decision-making Task Type).***

A Conceptual Style decision-making usually involves complex situations and an environment with a high level of risk, while a Behavioural Style decision requires rich information and discussion before coming to the final decision. These types of decision styles in Manufacturing Supply Chain are able to be defined as a complex situation and environment decision. The decision may not have a single "right answer"; it may generate and evaluate many possible solutions and may be difficult to define due to the complex nature of the situation. The E-Collaboration Technologies did not support the collaborative decision-making for these types of decisions.

Table 7.4 summarizes the answer for RQ 2.2 as below:

Table 7.4 Summary to answer RQ 2.2

RQ 2.2: How does E-Collaboration Technologies enable collaborative decision-making in Manufacturing Supply Chain?	
E-Collaboration Technologies give **POSITIVE** impact on:	
What?	Efficiency of... *Any types of collaborative decisions. It is not contingent upon any types of collaborative decisions (Strategic or Operational), decision styles and the task types.* Effectiveness of… *Directive Style decision-making (under Decision-making Task Type).*
How?	1. *Directive Style (under Decision-making Task Type) characteristics:* • *This style assumes that the decision-maker has sufficient information to examine all the relevant options and make an effective decision.* • *The system is fully utilized and become the main source of information during decision-making process.*

E-Collaboration Technologies give **NEGLIGIBLE (LOW)** impact on:	
What?	Effectiveness of… *Conceptual Style decision-making (under Intellective Task Type) and Behavioural Style (under Decision-making Task Type).*
How?	1. *Conceptual Style (under Intellective Task Type) Characteristics:* • *Involves complex situations and environment with high level of risk,* • *It may has several possible way to solve the problems which will be driven the decision-making.* 2. *Behavioural Style (under Decision-making Task Type) characteristics:* • *Requires rich information and discussion before coming to the final decision.* • *Attempt to reconcile differences and negotiate a solution that is acceptable to all parties*

7.3 Answer to Research Question 3

The purpose of Research Question 3 is to identify the factors that contributed to inter-organizational trust development in Service Supply Chain and Manufacturing Supply Chain. This question has been answered by identifying the preferences in methods of communication used during the collaborative decision-making process and the trust attributes involved in order to support the chances of successful collaboration initiatives.

In the literature review (Chapter 2), the researcher has found the commonly used definition of inter-organizational trust: *"the extent to which members of one organization hold a collective trust orientation toward another organization"* (Zaheer, McEvily, & Perrone, 1998). Relatedly, Currall and Inkpen (2002) draw attention to the socially constructed shared history within an organization towards another organization that constitutes a collective orientation. The answer to this research question is also an attempt to compare the trust antecedents found in the literature (Mayer and Davis, 1995; Zaheer and McEvily, 1998) with the trust attributes found in these cases.

Research question 3 is:

RQ 3: How can E-Collaboration Technologies give Positive or Negligible (low) impact for inter-organizational trust development in Service Supply Chain and Manufacturing Supply Chain?

Table 7.5 To answer RQ 3 – In the context of Service Supply Chain					
CASE STUDY	**CS 1**	**CS 2**	**CS 3**	**CS 4**	**CS 5**
The decision profile…	• The **STRATEGIC** decision is categorized under non-routine decision. • Types of collaborative decision involved in CS 1 was under **CONCEPTUAL STYLE decision-making.** • Decision category: **NEGOTIATE – Cognitive Conflict Task Type.**	• The **OPERATIONAL** decision is categorized under routine decision. • Types of collaborative decision involved in CS 2 was under **BEHAVIOURAL STYLE decision-making.** • Decision category: **CHOOSE – Intellective Task Type.**	• The **STRATEGIC** decision is categorized under non-routine decision. • Types of collaborative decision involved in CS 3 was under **ANALYTICAL STYLE decision-making** • Decision category: **CHOOSE – Decision-making Task Type.**	• The **STRATEGIC** decision is categorized under non-routine decision. • Types of collaborative decision involved in CS 4 was under **CONCEPTUAL STYLE decision-making**. • Decision category: **GENERATE – Planning Task Type.**	• The **STRATEGIC** decision is categorized under routine decision. • Types of collaborative decision involved in CS 5 was under **CONCEPTUAL STYLE decision-making**. • Decision category: **GENERATE – Creative Task Type.**
This case identifies…	• The adoption of E-Collaboration Technologies lead to **POSITIVE impact on TRUST DEVELOPMENT** during the collaborative decision-making process **in CS 1 and CS 2.**		• The adoption of E-Collaboration Technologies lead to **NEGLIGIBLE impact on TRUST DEVELOPMENT** during the collaborative decision-making process **in CS 3, CS 4 and CS 5.**		
This case identifies…	• Preferences to adopt **E-COLLABORATION TECHNOLOGIES** with **FACE-TO-FACE** as a supplement to the method of communication.		• Preferences to adopt **FACE-TO-FACE** method only as a method of communication.	• Preferences to adopt **FACE-TO-FACE** method with **E-COLLABORATION TECHNOLOGIES** as a supplement to the method of communication.	
This case identifies…	Trust attributes identified in this cases that are useful to increase the chances of success for collaborative initiative are: • Identifying partner's (the people and the organization) past and current performance and reputation in collaborative work. • Knowing each other before the collaboration starts.			• Identifying partner's (the people and the organization) past and current performance and reputation in collaborative work. • To ensure the partners have the ability and capability to the produce the designated task.	

7.3.1 Answer to RQ 3

Table 7.5 shows the pattern across cases in *Service Supply Chain* regarding the adoption of E-Collaboration Technologies on efficiency and effectiveness of collaborative decision-making that may lead to Positive or Negligible impacts of inter-organizational trust development. While Table 7.6 summarizes e interrelations between the different factors and the effects of medium of communication over trust attributes identified in each case.

The first step to answer research question 3 is to look at the preferences of communication medium adopted by decision-makers. This is related to the decision-making style and task type, as explained in answers to RQ 2.1 and RQ 2.2 on why certain kinds of medium of communication were preferred over others. Table 7.5 relates the preferences with the trust attributes where the result produced a Positive or Negligible (low) outcome on trust development towards collaborative decision-making process.

As we can see in CS 1 and CS 2, the preferences of communication methods used in collaborative decision-making process were E-Collaboration Technologies with the face-to-face method as a supplementary method. This condition reflected back to the types of decision and the decision-making style as explained in RQ 2.1. These decisions involved Conceptual Style and Behavioural Style decision-making and the impact on efficiency and impact on effectiveness were Positive. The main method of communication adopted during the decision-making process was using an online meeting tool called GoToMeeting. However, since the decision was complex in nature, face-to-face meeting became the supplementary method of communication in order to get in-depth information regarding the issue. The consideration to apply both methods of communication was higher as the nature of the decision required rich information, which could be achieved by applying both methods of communication.

The adoption of E-Collaboration Technologies gave a Positive impact on trust development during the collaborative decision-making process in CS 1 and CS 2; this is because, before the collaborative relationship started, all partners already knew each other. Moreover, some of them had worked together on other collaborative

projects, so they had identified partners' past and current performance and their reputation in collaborative works. This condition supports the condition that adopting E-Collaboration Technologies as the main method of communication and face-to-face meeting as a supplementary method during the collaborative decision-making process resulted in a Positive impact on trust development.

As in CS 3, the preference for communication methods used in collaborative decision-making was face-to-face method only and they did not consider using E-Collaboration Technologies. The impact of E-Collaboration Technologies on effectiveness of collaborative decision-making was Negligible (low) and resulted in a Negligible (low) impact on trust development too. This is because of the complex nature of the decision, as it was not promising to make it via online meeting. Even though there were some trust attributes identified among the partners before the collaborative initiative started, decision-makers were not convinced that decisions that involved technical parts and, indeed, capability to do just-in-time problem-solving like coding or programming could be made using online meeting. Face-to-face method was most preferable no matter whether the key decision-makers had to travel which would include cost and time. In order to make the collaboration initiative successful, the key decision-makers agreed that the trust attributes should be identified before and during the collaboration. This is to ensure that they will achieve a high quality decision-making that will give benefits for the collaborative partners.

As in CS 4 and CS 5, the method of preference was face-to-face only and E-Collaboration Technologies were a supplement for communication. It produces a Negligible (low) impact on trust development during the collaborative decision-making process. This condition reflects the decision-making style in CS 4 and CS 5 where it involved Conceptual Style decision-making which requires creative and artistic problem-solving. As explained in the answer for RQ 2.1, this type of decision-making requires an artistic-minded task and it cannot be done solely via E-Collaboration Technologies. It can only be used as a supplementary method to face-to-face meeting. Face-to-face meeting was most favourable in the context of making decisions in CS 4 and CS 5, as it was more convincing. The E-Collaboration Technologies were able to assist with the documents transactions and post-decision

activities but not in terms of making the decision itself. Trust attributes that are important for this kind of decision with the preferences in medium of communication were more on identifying partners' performance and reputation as well as knowing their ability and capability to produce the designated tasks.

Table 7.6 To answer RQ 3 – In the context of Manufacturing Supply Chain			
The decision profile…	**CS 6**	**CS 7**	**CS 8**
This case identifies…	• The **STRATEGIC** decision is categorized under non-routine decision. • Types of collaborative decision involved in CS 6 was a **CONCEPTUAL STYLE decision-making**. • Decision category**: CHOOSE – Intellective Task Type.**	• The **OPERATIONAL** decision is categorized under routine decision. • Types of collaborative decision involved in CS 7 was a **BEHAVIOURAL STYLE decision-making.** • Decision category: **CHOOSE – Decision-making Task Type.**	• The **OPERATIONAL** decision is categorized under routine decision. • Types of collaborative decision involved in CS 8 was a **DIRECTIVE STYLE decision-making**. • Decision category: **CHOOSE – Decision-making Task Type.**
This case identifies…	• The adoption of E-Collaboration Technologies lead to **POSITIVE impact on TRUST DEVELOPMENT** during the collaborative decision-making process in CS 6.	• The adoption of E-Collaboration Technologies lead to **NEGLIGIBLE impact on TRUST DEVELOPMENT** during the collaborative decision-making process in CS 7.	• The adoption of E-Collaboration Technologies lead to **POSITIVE impact on TRUST DEVELOPMENT** during the collaborative decision-making process in CS 8.
This case identifies…	• Preferences to adopt **FACE-TO-FACE** method with **E-COLLABORATION TECHNOLOGIES** as a supplement to the method of communication.		• Preferences to adopt **E-COLLABORATION TECHNOLOGIES** with **FACE-TO-FACE** as a supplement to the method of communication.
This case identifies…	Trust attributes identified in this cases that are useful to increase the chances of success for collaborative initiative are: • Identifying partner's honesty and openness. • Knowing and meeting the partners before the collaboration starts.		• Identifying partner's honesty in terms of getting and putting the right and valid information in the system. • To ensure the compatibility of E-Collaboration system use in the organization.

In *Manufacturing Supply Chain* cases, the preference of communication methods used in the collaborative decision-making process in CS 6 was Face-to-face method with E-Collaboration Technologies being used as a supplementary method. This condition reflected back to the types of decision and the decision categories as explained in RQ 2.2. This decision involved Conceptual Style decision-making and the impact on efficiency was Positive but the impact on effectiveness was Negligible (low). The consideration to apply the face-to-face method of communication is because the decision requires in-depth discussion, and long-term decision-making needs to be made prior to CS 6; moreover, the key decision-makers were located in the same organization but in different departments. However, E-Collaboration Technologies still made some significant contributions to the trust development during the collaborative decision-making process and it resulted in a Positive impact. Because of that, the trust attributes that were important for the decision-makers to identify before and during the collaboration are: to identify the partners' honesty and openness (benevolence) that are able to help them build initial trust. Knowing and meeting the partners before the collaboration starts were also important factors that became a booster for the success of the collaboration. Moreover, partners involved in CS 6 were located in the same organization but might be in different branches in the UK. This resulted in the Positive impact on trust development during the collaborative decision-making process.

CS 7 involved the planning on product distribution with their customers and suppliers where the face-to-face method of communication was needed for collaborative relationship engagement. The adoption of E-Collaboration Technologies somehow resulted in the Negligible (low) impact on trust development during the collaborative decision-making process. This situation comes from the experience when they faced difficulty with the supplier who changed their way of working and all the technologies they were using did not use the same process as before. This condition affected the whole process of the business operations. The nature of the collaborative decision background was somehow complex and more descriptive discussions with the customers and suppliers were required. The tasks involved in the collaborative decision in CS 7 required richer information and there were a lot of documents involved during the collaborative decision-making process.

Therefore, they decided to adopt face-to-face methods of communication with E-Collaboration Technologies as a supplementary way.

With regard to CS 8, the preference of using only E-Collaboration Technologies as a method of communication related to the type of decision and the decision category. It is a Directive style decision-making and the E-Collaboration Technologies in the manufacturing system, such as ERP and EDI, were fully utilized in the decision-making process. Trust attributes that are important in this type of decision are to identify partners' honesty in terms of getting and putting the right and valid information in the system. This is because the collaborative decision-making in Directive Style involves short-term and quick decisions; it has also been carried out as a routine process at the operational level of manufacturing. A sufficient amount of information from the system is important to assist the decision-making. Because of that, ensuring the compatibility of the E-Collaboration Technologies used in the organization in order to achieve the objective is very important for decision-making. This condition resulted in a Positive impact on trust development during the collaborative decision-making process.

The findings from the cases conclude that the Positive or Negligible (low) impact on trust development during the collaborative-decision making process is contingent upon the preferences of communication methods as well as the types of decision and the style of decision-making involved. Trust attributes are important to support the chances of successful collaboration initiatives.

Table 7.7 shows the inter-relationship between the preference of communication methods and trust attributes in each case. Trust attributes are pre-requisite and become the important element to establish the collaborative relationship between the key decision-makers. As we can see in Table 7.7, there are five trust attributes found in the cases, which consist of History of interactions, Partner's performance and reputations, Partner's ability and capability, Benevolence and System compatibility. Those are the factors that need to be in place before establishing the collaborative relationship as agreed by the key decision-makers.

All of the trust attributes were considered when dealing with the adoption of E-Collaboration Technologies with face-to-face as a supplementary method of

communication. This was to ensure that further communication via E-Collaboration Technologies can be adopted as an efficient way to conduct effective collaborative decision-making since the key decision-makers did not physically meet.

When dealing with the preference to use face-to-face method only, three key trust attributes were found to be important to establish the trust development: *history of interactions*, identify the *partner's performance and reputations* and identify *the partner's ability and capability* to produce the tasks. Since E-Collaboration Technologies did not support the collaborative decision-making in this specific issue, the key decision-makers need to have a physical interaction with the collaborative partners. If they have had a physical meeting beforehand, it can help to build the trust development and to create a strong collaborative relationship. Identifying the partner's performance and reputation as well as their ability and capability to produce the designated tasks were the main factors that helped key decision-makers to make a successful collaboration.

However, when dealing with adoption of face-to-face methods with E-Collaboration Technologies as a supplement to the communication, four trust attributes were most important to be considered. They are having a *history of interactions*, identify the *benevolence* between the collaborative partners, identify the *partner's performance and reputations* and identify the *partner's ability and capability* to produce the tasks. After establishing the face-to-face interaction and identifying those factors that are able to build trust development, E-Collaboration Technologies become the secondary method in the process of decision-making communication.

Table 7.7 – Inter-relation between preferences of communication and trust attributes in every cases.

Service Supply Chain					
PREFERENCE OF COMMUNICATION MEDIUM	**E-Collaboration Technologies with Face-to-face as supplementary method**		**Face-to-face only**	**Face-to-face with E-Collaboration Technologies as supplementary method**	
TRUST ATTRIBUTES / CASES	CS 1	CS 2	CS 3	CS 4	CS 5
History of interactions	✓	✓	✓	N/A	N/A
Partner's performance and reputations	✓	✓	✓	✓	✓
Partner's ability and capability	✓	✓	✓	✓	✓
Manufacturing Supply Chain					
TRUST ATTRIBUTES / CASES	CS 8		N/A	CS 6	CS 7
History of interactions	✓			✓	✓
Benevolence	✓			✓	✓
System compatibility	✓			N/A	N/A

As a result, the answer to Research Question 3 would be as follows:

The E-Collaboration Technologies are able to give a Positive or Negligible (low) impact on inter-organizational trust development in collaborative decision-making in Service Supply Chain and Manufacturing Supply Chain. It depends on the medium of communication that is preferable to be used; whether the decision-makers are adopting:

- Face-to-face method with E-Collaboration Technologies as a supplementary method of communication.

- E-Collaboration Technologies with face-to-face as a supplementary method of communication.

- Face-to-face method only.

*As a result, E-Collaboration Technologies give a **Positive impact** for trust development in Conceptual Style, Behavioural Style and Directive Style decision-making and a **Negligible (low)** impact in Analytical and Conceptual style decision-making that involved creative and artistic problem solving. It could be identified that the presence of trust attributes provides a better opportunity for the decision-makers to be committed to the collaboration. The medium of communication used during the process of decision-making affects the quality of the decision-making itself.*

Table 7.8 below summarizes the answer for RQ 3.

Table 7.8 Summary to answer RQ 3

RQ 3: How can E-Collaboration Technologies give Positive or Negligible (low) impact for inter-organizational trust development in Service Supply Chain and Manufacturing Supply Chain?	
E-Collaboration Technologies give **POSITIVE** impact on:	
What?	*Decision-making Style…* • *Conceptual Style, Behavioural Style and Directive Style decision-making.*

How?	*Preference of communication methods used during the collaborative decision-making process:* • *E-Collaboration Technologies with Face-to-face communication as a supplementary method.*
Why?	*Trust attributes that contribute to trust development during the collaborative decision-making process:* • *History of interactions.* • *Identify partner's performance and reputations.* • *Identify partner's ability and capability to produce the designated tasks.* • *Benevolence.* • *System compatibility.*
E-Collaboration Technologies give **NEGLIGIBLE (LOW)** impact on:	
What?	*Decision-making Style…* *Analytical Style, Behavioural Style (under Decision-making Task Type) and Conceptual Style (under Planning Task Type and Creative Task Type).*
How?	*Preference of communication methods used during the decision-making process:* • *Face-to-face only.* • *Face-to-face with E-Collaboration Technologies as a supplementary method.*
Why?	*Trust attributes that contribute to trust development during the collaborative decision-making process:* • *History of interactions.* • *Identify partner's performance and reputations.* • *Identify partner's ability and capability to produce the designated tasks.* • *Benevolence.*

7.4 The Emerging Propositions

In discussing the analyzed data and presenting answers to RQ 2 and RQ 3, there are four propositions developed regarding the impact of E-Collaboration Technologies in efficiency, effectiveness and trust development of collaborative decision-making in Service Supply Chain and Manufacturing Supply Chain.

Proposition 1

The E-Collaboration Technologies give a positive impact on the efficiency of collaborative decision-making in the Service Supply Chain and Manufacturing Supply Chain, not considering what kind of decision-making styles or the decision task types.

Proposition 2

The adoption of E-Collaboration Technologies in Service Supply Chain give positive impact towards the effectiveness of collaborative decision-making, these include Conceptual Style decision-making (under Cognitive Conflict Task Type) and Behavioural Style decision-making (under Intellective Task Type).

However, the adoption of E-Collaboration Technologies give negligible (low) impact in Analytical Style decision-making (under Decision-making Task Type) and Conceptual Style (under Planning Task Type and Creative Task Type) decision-making.

Proposition 3

The adoption of E-Collaboration Technologies in Manufacturing Supply Chain give positive impact towards the effectiveness of collaborative decision-making, this includes Directive Style decision-making (under Choose: Decision-making Task Type).

However, the adoption of E-Collaboration Technologies give negligible (low) impact in Conceptual Style decision-making (under Choose: Intellective Task Type) and Behavioural Style decision-making (under Choose: Decision-making Task Type).

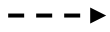
Proposition 4

E-Collaboration Technologies give a Positive impact for trust development in Conceptual Style, Behavioural Style and Directive Style decision-making and a Negligible (low) impact in Analytical and Conceptual style decision-making that involved creative and artistic problem-solving.

7.5 The Developed Conceptual Framework

Figure 7.2 shows the developed framework for the findings, and is an extension of the conceptual framework in Chapter 3. At the start of the research, a conceptual framework was proposed that depicted the different factors and their interrelations that affect the collaborative decision-making. Throughout the empirical work, the framework has developed as in Figure 7.1. Table 7.6 is the description of the figure.

Table 7.9 Descriptions of arrows in Figure 7.2

	Solid black arrows are indicated for the interrelations between the different factors that were identified through the literature review and were confirmed by this research.
 	**Dash arrows are indicated for the new relations found in the research findings:** Dotted black arrows are indicated for the relations between the factors and the constructs. Red arrows are indicative of the impact of E-Collaboration Technologies on Decision-making Style and Task Type. Red arrows represent Negligible (low) impact of E-Collaboration Technologies towards the effectiveness of complex collaborative decision-making. Green arrows are indicative of the impact of E-Collaboration Technologies on Decision-making Style and Task Type. Green arrows represent Negligible (low) impact of E-Collaboration Technologies towards the effectiveness of simple collaborative decision-making.

	Descriptions of the arrows:
No. 1, 2	The relationship between Service Supply Chain and Manufacturing Supply Chain towards Conceptual Factors and Social Factors as mentioned in the review of literature.
No. 3, 4	The relationship on the impact of E-Collaboration Technologies towards efficiency, effectiveness and trust development of the Decision-making Styles and Task Types as discussed in Chapter 6 and Chapter 7.
No. 5, 6, 7, 8, 9	The 'attitudes towards Technologies adoption' is a connection between the location, preferences in medium of communication, and trust attributes towards trust development in collaborative decision-making. This research found that, in order to get Positive or Negligible (low) impact towards trust development, those related factors are the main points that need to be considered upon.

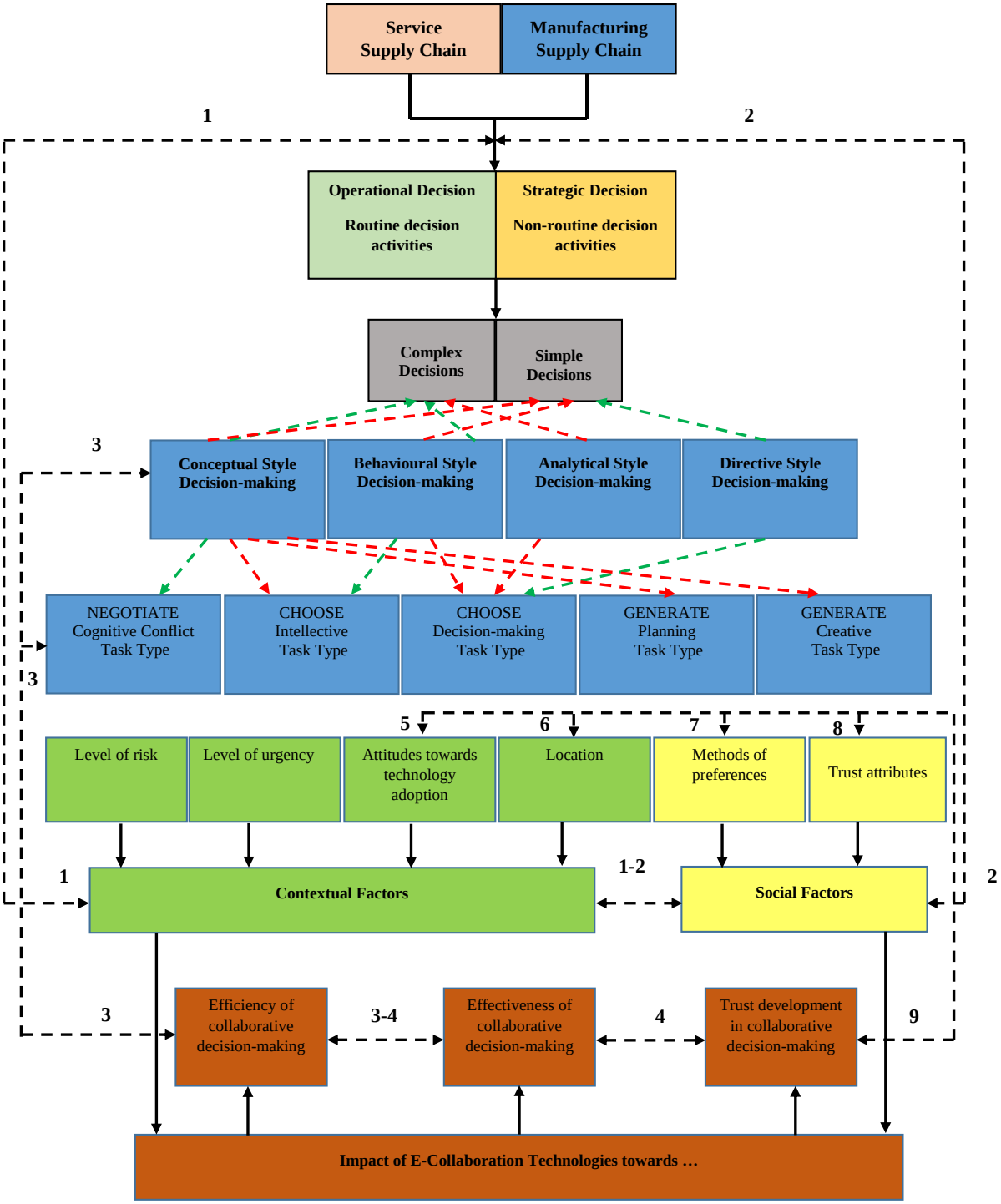


Figure 7.2 The Developed Framework

Consequently, this research found that the impact of E-Collaboration Technologies on the efficiency and effectiveness of collaborative decision-making is then interrelated with the complexity or simplicity of the decisions and it is also related to the decision-making styles and task types. However, the level of decision-making, whether it is strategic or operational, is not the major concern in these relations.

The summary of the main finding of this research is that there are certain kinds of decisions that are able to give a Positive impact or Negligible (low) impact on efficiency, effectiveness and trust development of collaborative decision-making when E-Collaboration Technologies are adopted during the decision-making process. Those decisions were then categorized based on the style of decision-making together with the decision's task types.

7.6 Summary

This chapter aimed at conducting a cross-case and pattern matching across the examined cases. Commonalities and discordances across cases are presented in this chapter while providing detailed cross-case analysis tables. This chapter also presented clear and explicit answers to Research Questions 2 and 3 as well as a developed framework derived from the findings of the cross-case analysis.

The next chapter aims to reach closure via discussing the research findings and identifying contributions to theory and practice as well as evaluating the overall quality and validity of the research findings.

CHAPTER 8

DISCUSSION AND CONCLUSION

8.1 Research Objectives Re-visited

The aim of this research was to explore and identify whether or not E-Collaboration Technologies enable collaborative decision-making in the Service Supply Chain and Manufacturing Supply Chain in terms of efficiency, effectiveness and trust development of collaborative decision-making. The comprehensive material of this study also makes an empirical contribution by enhancing our knowledge regarding what types of decision styles and decision tasks enable adoption of E-Collaboration Technologies during the decision-making process specifically in supply chain activities.

As a reminder, this research aimed to answer three research questions as below:

RQ 1: *What are the types of collaborative decisions that are made in Supply Chain?*

RQ 2: *How does E-Collaboration Technology enable collaborative decision-making in:*

- *Service Supply Chain?*
- *Manufacturing Supply Chain?*

RQ 3: *What are the factors that contribute to the inter-organizational trust development in the Service Supply Chain and Manufacturing Supply Chain?*

The researcher conducted the research to answer the above research questions in two parts:

- To answer RQ 1, the researcher conducted an extensive and exploratory review of literature about Supply Chain Management in order to identify and examine what types of collaborative decisions are involved in supply chain activities.

- To answer RQ 2 and RQ 3, the researcher conducted empirical research consisting of within-case and cross-case analysis in five Service Supply Chains and three Manufacturing Supply Chains.

It is valuable to note that the researcher progressed towards the objectives throughout the research by following the defined research methodology in Chapter 4 and Chapter 5. To guide the empirical work, a careful literature review was set as the boundary of this research. Qualitative data were analysed through multiple cases and the findings were proved to be reliable following a peer-review process. The researcher is confident that this research is able to give its own contribution to knowledge and to the practitioners, as will be discussed in depth in the following section.

8.2 Discussions of Findings

The findings of this research have led to the development of the conceptual framework as proposed in Figure 7.2 in Section 7.4 in Chapter 7. The developed conceptual framework, the answer to the three research questions, and the series of propositions outlined in Section 7.4 are summarized in Figure 8.1 below and presented as the conclusion of this work.

QUADRANTS	*GENERATE*		*CHOOSE*		*NEGOTIATE*		*EXECUTE*	
DECISION-MAKING STYLES / TASK TYPES	*Creativity Tasks*	*Planning Tasks*	*Intellective Tasks*	*Decision-making Tasks*	*Cognitive Conflict Tasks*	*Mixed-motive Tasks*	*Contests / Battles / Competitive Tasks*	*Performances / Psycho-motor Tasks*
Conceptual Style	**- ve**	**- ve**	**- ve**		**+ ve**	N/A	N/A	
Behavioural Style			**+ ve**	**- ve**		N/A		
Analytical Style				**- ve**		N/A		
Directive Style				**+ ve**		N/A		

Table 8.1 Result shows that E-Collaboration Technologies give Positive or Negligible (low) impact on **EFFECTIVENESS** to certain decision-making styles and task types.

PREFERENCE OF COMMUNICATION MEDIUM	**E-Collaboration Technologies with Face-to-face as supplementary method**			**Face-to-face only**	**Face-to-face with E-Collaboration Technologies as supplementary method**			
TRUST ATTRIBUTES	*Conceptual Style (Cognitive Conflict Task Type)*	*Behavioural Style (Intellective Task Type)*	*Directive Style (Decision-making Task Type)*	*Analytical Style (Decision-making Task Type)*	*Conceptual Style (Planning Task Type)*	*Conceptual Style (Creative Task Type)*	*Conceptual Style (Intellective Task Type)*	*Behavioural Style (Decision-making Task Type)*
History of interactions	√	√	√	√			√	√
Partner's performance and reputations	√	√		√	√	√		
Partner's ability and capability					√	√		
Benevolence			√				√	√
System Compatibility			√					

Table 8.2 Result indicated that as long as an element of Face-to-face communication is marked, use of E-Collaboration Technologies confirm to enable trust development among collaborate partners by giving impact on the following trust attributes.

<table>
<tr><td colspan="3">RQ 1: What are the types of collaborative decisions that are made in Supply Chain?
• There are four major decisions that has been made in supply chain management (Ganeshan, 2002). They are location, production, inventory and transportation that have been made in strategic, tactical and operational level.
• The decision in supply chains fall under three phases or categories. They are supply chain strategy or design, supply chain planning and supply chain operations.</td></tr>
<tr><td>RQ 2: How does E-Collaboration Technology enable collaborative decision-making in Service Supply Chain and Manufacturing Supply Chain?</td><td colspan="2">Table 8.1</td></tr>
<tr><td>RQ 3: How can E-Collaboration Technologies gives Positive or Negligible (low) impact in inter-organizational trust development for Service Supply Chain and Manufacturing Supply Chain context?</td><td>Table 8.2</td><td>The Emerging Propositions:

Proposition 1 – Proposition 6

(as in Section 7.4 – Chapter 7)</td></tr>
</table>

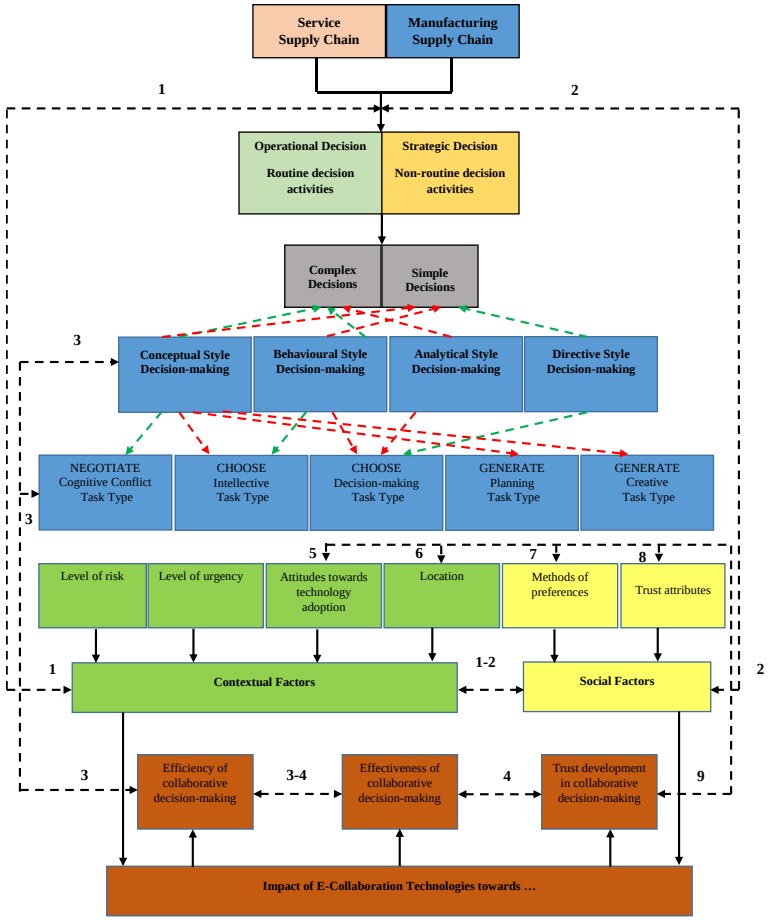


Figure 8.1 Summary of findings from this research

8.3 Assessing the Research Quality

The researcher believes that this research follows and incorporates the quality aspects, as much as possible. This is to ensure and guarantee the repeatability and validity of the research output. It is essential to critically assess this research in order to achieve a high research quality standard and to identify the validity of this research. The research quality criteria for evaluating this research were discussed in Chapter 5. The section below will discuss the assessment in detail and provide a summary in Table 8.3.

This research follows different tactics to ensure research quality identified by Yin (2003). This is important in order to conduct rigorous case study research. This research started with a careful review of different aspects of research areas involved in this study which then led to the development of the conceptual framework that underpins this research. The conceptual framework was deduced from the literature and research questions guided the fieldwork, providing solid grounds to look at collaborative decision-making and E-Collaboration Technologies in order to ensure the research quality from the start of this study.

Then, the next phase was to find the reliable and valid answers to the research questions. It is important for the researcher to identify that he or she follows the right research process. The accuracy of a research study is demonstrated through logical and rational research (Yin, 2003; Easterby-Smith et al, 2008). Generally, four tests are applied to assess the quality of the research process. These are; constructed validity, internal validity, external validity and reliability.

Table 8.3 Evaluation of research quality criteria

Research quality criteria	Description	Case Study Tactic	How was this achieved in the research?	Where addressed in the thesis?
Construct validity	The extent to which the researcher established correct operational measures for the concept being studied.	• Use multiple sources of evidence • Establish chain of evidence • Have key informants' review draft case study reports	Selection of multiple data collection techniques, enfolding literature, establishing a chain of evidence and structure reporting. Conceptual framework was developed from a careful selection of literature review provided better construct validity.	Chapters 2, 3, 6, 7
Internal validity	The extent to which the researcher can establish a causal relationship.	• Do pattern matching • Do explanation building • Address rival explanations • Use logic models	Pattern matching and explanation building were used to ensure the research internal validity.	Chapters 6, 7
External validity	The extent of generalizing study findings beyond the immediate case study.	• Use theory in single-case studies • Use replication logic in multiple-case studies.	Multiple case-study research design was employed using replication logic in eight case studies. Multiple case studies used the same conceptual framework and pattern matching was carried out.	Chapters 5, 6, 7
Reliability	The extent to which a study operations can be repeated with the same results.	• Use case study protocol • Develop case study database	An early definition of research quality criteria, case study database, case study protocol, case study reports, cross-case analysis, within-case analysis and pattern matching, enfolding literature and structured reporting are all aimed at enhancing the reliability of this research.	Chapters 5, 6, 7

8.4 Contribution to Knowledge

Contribution to knowledge refers to the novelty of research findings to further the scientific knowledge. The theoretical contribution of this study is outlined in the previous chapter by providing unambiguous answers to the research questions. Answering the research questions provides new insights into the impact of E-Collaboration Technologies on efficiency in collaborative decision-making, effectiveness in collaborative decision-making and trust development in collaborative decision-making. Findings from the research questions extend the relationship of the E-Collaboration Technologies' impacts in three main headings: decision-making styles, the task types and trust development.

8.4.1 Decision-making Styles

The first contribution of this research is about the impact of adopting E-Collaboration Technologies on specific types of decision-making styles and the task types in the Service Supply Chain and Manufacturing Supply Chain decision activities. In the review of literature, there was extensive discussion on characteristics of the decision-making styles adopted by the managers in their organizations. This research, however, endeavoured to relate the impact of adopting E-Collaboration Technologies to specific decision-making styles and to look at the consequences that may occur – whether it has a Positive impact or Negligible (low) impact on efficiency, effectiveness and trust development in collaborative decision-making.

This research succeeded in identifying different types of decision-making styles that have a Positive impact on adoption of E-Collaboration Technologies during the decision-making process as well as a Negligible (low) impact. This finding contributes to the extension of theories in decision-making in the supply chain with relation to the adoption of communication technologies in the decision-making process.

8.4.2 The Task Types

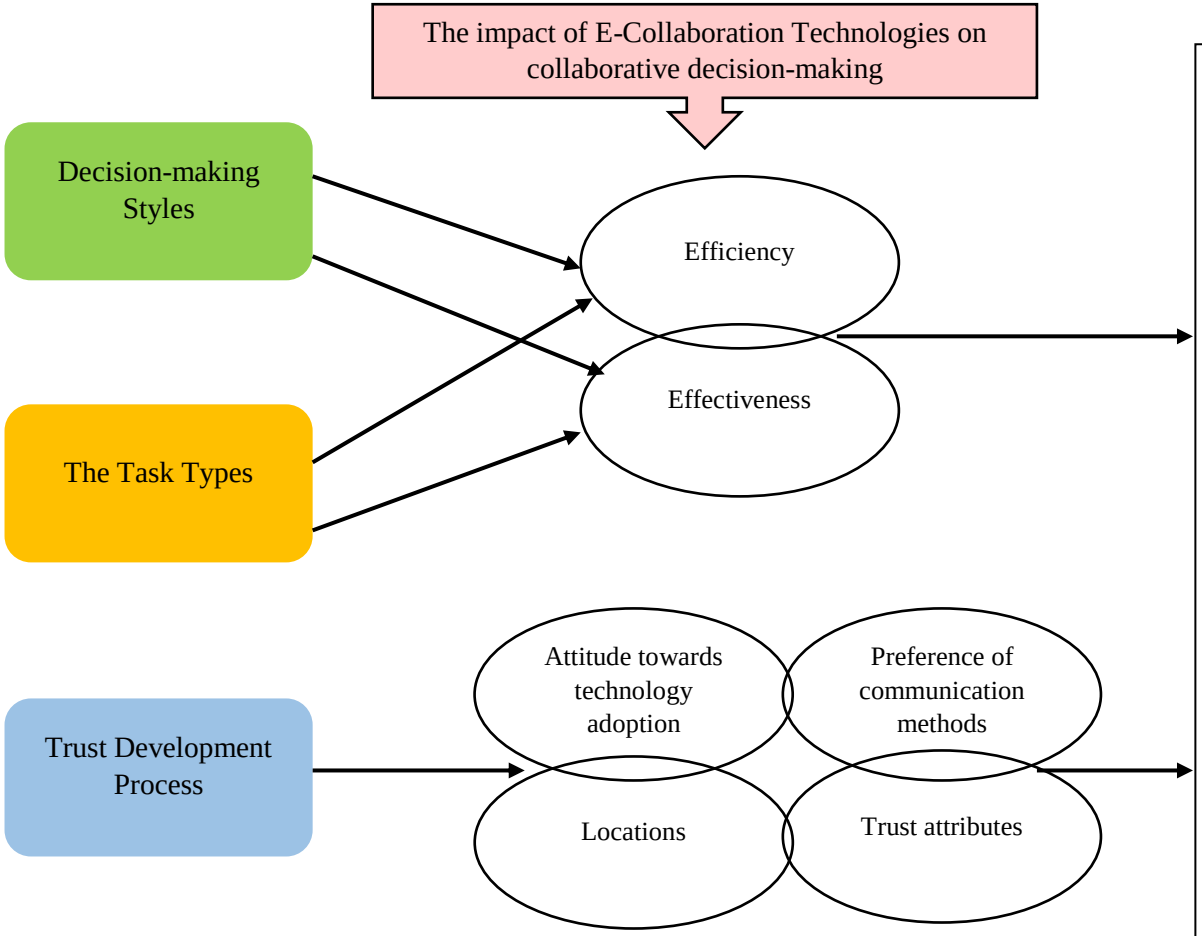
The second contribution of this research is about identifying the relationship of the task types with decision-making styles. Based on the Circumplex Model of Group

Task Types proposed by McGrath (1984), this research identified the accurate characteristics of the group task types with decision-making styles and the relationship to the impact of E-Collaboration Technologies' adoption. It is important to understand that variation between the channel of communication in group process and outcome is dependent on or interacts with task types. This finding contributes to new theory development in the context of the impact of E-Collaboration Technologies on collaborative decision-making in Service Supply Chain and Manufacturing Supply Chain.

8.4.3 The Trust Development

The third contribution of this research stems from the confirmed and new insights of the trust attributes found in the relationship with successfulness of collaborative initiatives. It provides new insights that the preference of communication methods, whether adopting face-to-face or E-Collaboration Technologies, impacts on trust development during the collaborative decision-making process. Besides this, the result confirmed that trust attributes, as discussed in the model of trust by Mayer et al. (1995) were identified as a crucial factor to establish commitment in collaborative relations.

Figure 8.2 provides a summary of the research contributions.



- This research succeeded in identifying different types of decision-making styles that have a Positive impact on adoption of E-Collaboration Technologies during the decision-making process as well as a Negligible (low) impact.
- This finding contributes to the extension of theories on decision-making in the supply chain with relation to the adoption of communication technologies in the decision-making process.
- This research identified the accurate characteristics of the group task types with decision-making styles and the relationship to the impact of E-Collaboration Technologies adoption. It is important to understand that variation between the channel of communication in group process and outcome is dependent on or interacts with task types.
- This research provides new insights that the preference of communication methods, whether adopting face-to-face or E-Collaboration Technologies, impacts on trust development during the collaborative decision-making process.
- The result confirmed that trust attributes as discussed in the model of trust by Mayer et al. (1995) were identified

Figure 8.2 Summary of the research contributions

8.5 Research Limitations

There is always a limit to what a researcher can realize during a research study and there is always room for improvement by future research. The limitations of this work are related to the research results and research methodology.

The research findings are based on eight case studies; five cases in Service Supply Chain and three cases in Manufacturing Supply Chain where it involved two collaborative projects. The researcher is satisfied with the number of cases involved; however if this research had been able to include another two collaborative projects, it would be better in terms of variations of collaborative decision-making made in supply chains that will be reflected back to the outcome eventually. However, because of the time constraint that the researcher needed to follow in order to achieve the Doctorate, this could not be achieved.

In qualitative research, subjectivity is a synonym key ingredient and should be treated as a limitation. In qualitative studies, the researcher needs to minimize the bias from her observations and logical thinking to ensure the validity of the research. In this research, the researcher is confident that the results and findings are, to a great extent, as objective as possible. The careful design of the research process ensured that the required steps and tactics to minimize bias were adopted. To avoid subjectivity in data interpretations, the researcher designed a case study review protocol, writing case study reports, triangulating data from multiple sources such as face-to-face interview, Skype interview, interview recordings, documentations, desk research and direct observations, and following Miles and Huberman's (1994) pattern-matching technique across the examined cases.

8.6 Theoretical Implications and Opportunities for Future Research

The findings of this research could be identified as supportive and extending previous studies in the same area. However, the researcher believes that this study provides a new insight in relating multi-disciplinary areas in one research. Frankly, during the literature review process, the researcher did not find any previous research that related to Supply Chain Management, E-Collaboration Technologies,

management decision-making and trust concept in a single study. Since this research identified the impact of E-Collaboration Technologies on specific decision-making styles and the task types as well as looking at the trust development process, there are some potential opportunities for future research.

The emerging propositions as outlined in Section 7.4 are presented as a springboard for future empirical investigations, regarding what should be improved, changed and enhanced for new findings. This research also may be valuable to be conducted in mix-methods research design in order to provide rich data for analysis. Survey method is the most suitable to be combined with the case study. A survey can be carried out to explore the trust development concepts with relation to the methods of communication that are preferred during the decision-making process.

Another opportunity for future research would be undertaking action research for Manufacturing Supply Chain unit of analysis. This is interesting since the E-Collaboration Technologies adopted in their decision-making process are business process tools that provide facts and figures. Information is extracted mainly from the system to assist the decision-making. Action research will provide an opportunity for the researcher to experience the E-Collaboration Technologies that have been adopted in the decision-making process and will provide in-depth understanding about the impact of the specific E-Collaboration Technologies on decision-making style and task types.

8.7 Practical Implications

The findings of this study can be offered as advice or guidance to those adopting E-Collaboration Technologies in the supply chain decision-making process. The developed conceptual framework could be used as a thinking tool and the basis for discussion and planning when considering or faced with certain types of decision-making styles adopted by the key decision-makers. It could also provide guidance on what types of communication methods should be implemented when the decision-makers are dealing with certain types of decisions that need to be made collaboratively. This study is also able to provide what types of trust attributes that should be considered and identified before and during the collaborative relationship

started when E-Collaboration Technologies becomes one of the main methods of communication that will be adopted.

8.8 Personal Reflections

Having reached the end of this thesis, I can say that conducting PhD research has been one of the most challenging experiences of my life, both professionally and personally. However, this journey has also been stimulating and interesting when to 'force' myself is the only way that I have been able to complete this research. There were a lot of ups and downs during the process of this research especially in the data collection and data analysis phases. In the data analysis phase, it took me quite a lot of time to complete the analysis since I needed to interview respondents from various locations across Europe using face-to-face meetings and Skype.

However, I did not have any regrets during the accomplishment of this research as it gave me a fruitful experience and new knowledge, and now I understand that 'the more I read, the less I know', and it makes me endeavour to explore new things. The Computer Mediated Communications field has always attracted my attention as my personal interest relates to technologies. I am very delighted to provide an inter-disciplinary research combining four types of research area, namely management decision-making, supply chain management, E-Collaboration Technologies and inter-organizational trust, and finally reach interesting findings that I hope will provide benefits to academics and practitioners.

BIBLIOGRAPHY

Adams, A., Sasse, M.A., (1999). Users Are Not the Enemy: Why Users Compromise Security Mechanisms and How to Take Remedial Measures. *Communications of the ACM,* Vol. 42 No. 12, pp. 40-46.

Agrawal, M.K. and Pak, M.H. (2001). Getting Smart about Supply Chain Management, *McKinsey Quarterly*, Vol. 2, pp. 22-7.

Akkermans, H., Bogerd, P. and Vos, B. (1999). Virtuous and Vicious Cycles on the Road Towards International Supply Chain Management, *International Journal of Operations & Production Management*, Vol. 19 No. 5/6, pp. 565-81.

Anderson, D.L and Lee, H.L. (1999). Synchronized Supply Chains: The New Frontier, in Anderson, D. (Ed.), Achieving Supply Chain Excellence Through Technology, Montgomery Research, San Francisco, CA.

Anthony, T. (2000), Supply Chain Collaboration: Success in the New Internet Economy, Achieving Supply Chain Excellence through Technology, Montgomery Research Inc., San Francisco, pp. 241-4.

Ashok Sinha, (2009). Supply Chain Management: Collaboration, Planning, Execution and Co-ordination. Global India Publication Pvt Ltd.

Bachmann, R., Inkpen., (2011). Understanding Institutional Based Trust Building Processes in Inter-organizational Relationships. *Organization Studies,* Vol. 32 No. 2, pp. 281-301.

Bafoutsou, G., & Mentzas, G. (2002). Review and functional classification of collaborative systems. *International Journal of Information Management*, Vol. 22 No. 4, pp. 281-305.

Balsmeier, P.W. and Voisin, W.J. (1996). Supply Chain Management: A Time-based Strategy, *Industrial Management,* Vol. 38 No. 5, pp. 24-8.

Baltes, B. B., Dickson, M. W., Sherman, M. P., Bauer, C. C., & LaGanke, J. S. (2002). Computer-Mediated Communication and Group Decision Making: A Meta-Analysis. *Organizational Behavior and Human Decision Processes*, Vol. 87 No. 1, pp. 344-354.

Barratt, M.A., Green, M., 2001. The Cultural Shift: The Need for a Collaborative Culture. In: *Conference Proceedings of Supply Chain Knowledge 2001*. Cranfield School of Management, UK.

Barratt, M., Oliveira, A., 2001. Exploring the Experiences of Collaborative Planning Initiatives. *International Journal of Physical Distribution & Logistics Management.* Vol. 31 No. 4, pp. 66–89.

Barratt, M.A. (2002). Ecploring Supply Chain Relationships and Information Exchange: A Case Study in the UK Grocery Sector, *PhD Thesis, Cranfield University*, Cranfield.

Barratt, M. (2004). Understanding the meaning of collaboration in the supply chain. *Supply Chain Management: An International Journal*, Vol. 9 No. 1, pp. 30-42.

Becerra, M., & Gupta, A. K. (2003). Perceived trust-worthiness Within the Organization: The Moderating Impact of Communication Frequency on Trustor and Trustee Effects. *Organization Science*, Vol. 14 No. 1, pp. 32-44.

Bechtel, C. & Jayaram, J. (1997). Supply Chain Management: A Strategic Perspective. *The International Journal of Logistics Management,* Vol. 8 No. 1, pp. 15-34.

Becker, J.F.F., Verduijn, T.M., Kumar, K., (2004). Supply Chain Collaboration Across Strategic, Tactical and Operational Planning. Available at: www.klict.org/docs/PPhr175.pdf.

Beech, N. (2005). Research Methodology. Strathclyde Business School, Glasgow UK.

Bello, D.C., Lohtia, R., Sangtani, V., (2004). An Institutional Analysis of Supply Chain Innovations in Global Marketing Channels. *Industrial Marketing Management* Vol. 33 No. 7, pp. 57-64.

Bennet, A., & Bennet, D. (2008). The Decision-Making Process for Complex Situations in a Complex Environment, pp. 1-14.

Berry, G. R. (2006). Can Computer-Mediated Asynchronous Communication Improve Team Processes and Decision Making? Learning From the Management Literature. *Journal of Business Communication*, Vol. 43 No. 4, pp. 344-366.

Berry, G. R. (2011). Enhancing Effectiveness on Virtual Teams: Understanding Why Traditional Team Skills Are Insufficient. *Journal of Business Communication*, Vol. 48 No. 2, pp. 186-206.

Bhattacharya, A.K., Coleman, J.L. and Brace, G. (1995). Re-positioning the Supplier: An SME Perspective, *Production Planning and Control,* Vol. 6 No. 3, pp. 218-27.

Bidgoli, H. (2012). E-collaboration: new productivity tool for the twenty-first century and beyond. *Business Strategy Series*, Vol. 13 No. 4, pp. 147-153.

Bjørn Erik Munkvold. (2006). Chapter 7 Collaboration Technologies , Tasks and Contexts Evolution and Opportunity. In *Book chapter co-authored with Ilze Zigurs. Human-Computer Interaction and Management Information Systems: Applications.* pp. 143-170.

Boorsma M., Van Oord J. (1992), Ketenintegratie, Tijdschrift voor Inkoop & Logistiek, Vol. 8, No. 6, pp. 40-48.

Bowers, J. (1994). The Work to Make a Network Work: Studying CSCW in Action. *In Proceedings of CSCW '94.* Chapel Hill, NC: ACM Press, pp. 287–299.

Bowersox, D.J., Closs, D.J. and Stank, T.P. (2000), "Ten mega-trends That will Revolutionize Supply Chain Logistics", Journal of Business Logistics, Vol. 21 No. 2, pp. 1-16.

Bryman, A. and Burgess, R.G. (2002). Analyzing Qualitative Data. Taylor & Francis e-Library.

Carlson, J.R., and Zmud, R.W. (1999). Channel Expansion Theory and the Experiential Nature of Media Richness Perceptions. *Academy of Management Journal*, Vol. 42 No. 2, pp. 153-170.

Carr, A.S., Pearson, J.N., (1999). Strategically Managed Buyer-Supplier Relationships and Performance Outcomes. *Journal of Operations Management* Vol. 17 No. 8, pp. 497–519.

Chopra, S., Dougan, D., Taylor, G., (2001). B2B E-Commerce Opportunities. *Supply Chain Management Review,* Vol. 5 No. 3, pp. 50–58.

Chopra, Sunil and P. Meindl. (2001). Supply Chain Strategy or Design : *Supply Chain Management: An International Journal*, (2 ed.), pp. 1-2.

Chopra, Sunil and Peter Meindl. (2004) Supply Chain Management. 2ed. Upper Saddle River: Pearson Prentice Hall.

Christiaanse, E., Kumar, K., (2000). ICT Enabled Coordination of Dynamic Supply Webs. *International Journal of Physical Distribution & Logistics Management*. Vol. 30 No. 3, pp. 268-285

Christopher, M. and Towill, D.R. (2000), An Integrated Model for the Design of Agile Supply Chains, *International Journal of Physical Distribution & Logistics Management,* Vol. 31 No. 4, pp. 4-17.

Cohen, M., Agrawal, N., Agrawal, V. (2006). Achieving Breakthrough Service Delivery Through Dynamic Asset Deployment Strategies, *Interfaces*, Vol. 36 No. 3.

Cook, R.L. and Garver, M.S. (2002). Subscription Supply Chains: The Ultimate Collaborative Paradigm, *Mid-American Journal of Business*, Vol. 17 No. 2, pp. 37-46.

Cramton, C.D. (2001). The Mutual Knowledge Problem and Its Consequences for Dispersed Collaboration. *Organization Science,* Vol. 12, No. 3, pp. 346-371.

Cousins, P.D., Menguc, B., (2006). The Implications of Socialization and Integration in Supply Chain Management. *Journal of Operations Management* Vol. 24 No. 9, pp. 604-620.

Coyle, J., E.J. Bardi, C.J. Langley, (1996). The Management of Business Logistics, 6th Edition, West Publishing, St. Paul, MN.

Currall, S.C., Judge T.A. (1995). Measuring Trust between Organizational Boundary Role Persons. *Organizational Behavior and Human Decision Processes*, Vol. 64 No. 2 pp. 151-170.

Daft, R.L., and Lengel, R.H. (1986). Organizational Information Requirements, Media Richness and Structural Design. Management Science, Vol. 32 No. 5, pp. 554-571.

David J. Snowden and Mary E. Boone (2007). A Leader;s Framework for Decision Making, Harvard Business Review. Accessed at http://hbr.org/2007/11/a-leaders-framework-for-decision-making/.

Dennis, A.R., and Valacich, J.S. (1999). Rethinking Media Richness: Towards a Theory of Media Synchronicity. In Proceedings of the Thirty-Second Annual Hawaii International Conference on System Sciences, 1. Washington, DC: *IEEE Computer Society*, p. 1017.

DeSanctis, G., and Poole, M.S. (1994). Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory. *Organization Science,* Vol. 5 No. 2, pp. 121-147.

DeVreede, Gert Jan; Briggs, Robert O., and Massey, Anne P. (2009). Collaboration Engineering: Foundations and Opportunities: Editorial to the Special Issue on the Journal of the Association of Information Systems. *Journal of the Association for Information Systems*, Vol. 10, pp. 121-137.

Diekmann, A., Lindenberg, S., (2001). Sociological Aspects of Cooperation. In: Smelser, N.J., Baltes, P.B. (Eds.), *International Encyclopedia of the Social & Behavioral Sciences.* Elsevier Science, Amsterdam

Dirks, K. T., & Ferrin, D. L. (2001). The Role of Trust in Organizational Settings. *Organization Science,* Vol. 12 No. 4, pp. 450-467.

Doring, N., (1998). Sozialpsychologie des Internet. Hogrefe, Gottingen.

Dubé, L., and Paré, G. (2004). The Multi-faceted Nature of Virtual Teams. In D.J. Pauleen (ed.), *Virtual Teams: Projects, Protocols, and Processes.* Hershey, PA: Idea Group Publishing.

Dyer. Jeffrey. H & Chu. Wujin. (2002). The Role Of Trustworthiness In Reducing Transaction Costs And improving Performance: Empirical Evidence From The United States, Japan, And Korea. Working paper.

Easterby-Smith, M., Thorpe, R., and Jackson, P, R. (2008). Management Research, (3rd ed.), London: Sage.

Eden, C. and Huxham, C. (2002). Essential Skills for Management Research: Action Research. Sage Publications.

Ellinger, A.E. (2002), Improving Marketing/Logistics Cross-functional Collaboration in the Supply Chain, Industrial Marketing Management, Vol. 25, pp. 85-96.

Ellram, L.M. and Edis, O.R.V. (1996). A Case Study of Successful Partnering Implementation, International Journal of Purchasing and Materials Management, Vol. 32 No. 4, pp. 20-8.

Ellram, L.M.,W.L. Tate and C. Billington. (2004). Understanding and Managing the Services Supply Chain, *Journal of Supply Chain Management*, Vol. 40 No. 4, pp. 17-32.

Eng, T-Y., (2006). An Investigation into the Mediating Role of Cross Functional Coordination on the Linkage between Organizational Norms and SCM Performance. *Industrial Marketing Management,* Vol. 35, pp. 762-773.

Fawcett, S.E. and Magnan, G.M. (2001), Achieving World- Class Supply Chain Alignment: Benefits, Barriers, and Bridges, CAPS Research / Institute for Supply Management, Tempe, AZ.

Feeny, D., (2001). Making Business Sense of the E-Opportunity. *Sloan Management Review*, pp. 45-51.

Fisher, M.L. (1997). What is the Right Supply Chain for Your Product?, *Harvard Business Review,* Vol. 75 No. 2, pp. 105-16.

Forrester, R. and Drexler, A.B. (1999). A Model for Team Based Organization Performance, *Academy of Management Executive,* Vol. 13 No. 3, pp. 36-49.

Forza, C. (2002). Survey Research in Operations Management: A Process-Based Perspective. *International Journal of Operations & Production Management,* Vol. 22, No. 2, pp. 152-194.

Frankel, R., Goldsby, T.J. and Whipple, J.M. (2002), Grocery Industry Collaboration in The Wake of ECR, *International Journal of Logistics Management*, Vol. 13 No. 1, pp. 57-72 .

Fulk, J.; Schmitz, J.; and Steinfield, C.W. (1990). A Social Influence Model of Technology Use. In J. Fulk and C.W. Steinfield (eds.), *Organizations and Communication Technology*. Newbury Park: Sage. pp. 117–140.

Ganeshan, R., Harrison, T. P., (2002). An Introduction to Supply Chain Management, *Department of Management Science and Information Systems*, Penn State University.

Grudin, J. (1988). Why CSCW Applications Fail: Problems In the Design and Evaluation of Organizational Interfaces. *In Proceedings of CSCW '88. New York:* ACM Press, pp. 85–93.

Grudin, J. (1994b). Groupware and Social Dynamics: Eight Challenges for Developers. *Communications of the ACM*, Vol. 37 No. 1, pp. 2-105.

Gulati, R. (1995). Does Familiarity Breed Trust? The Implications of Repeated Ties for Contractual Choice in Alliances, *Academy of Management Journal*, Vol. 38, pp. 85-112.

Handfield, R., Nichols, E., (2002). Supply Chain Redesign. Prentice-Hall, Upper Saddle River, NJ.

Handy, C., (1995). Trust and the Virtual Organization. *Harvard Business Review*, Vol. 73, 40-50

Hardin, R. (1991). Trusting Persons, Trusting Institutions. In R. J. Zeckhauser (Ed.), *Strategy and choice*. Cambridge: MIT Press

Harrison, E. F., & Francisco, S. (1996). A Process Perspective on Strategic Decision Making Environmental Assessment. *Management Decision*, Vol. 34 No. 1, pp. 46-53.

Harrison, E.F., (2000), A Process Perspective on Strategic Decision Making, *Management Decision*, Vol. 34, No. 1, pp. 46-53.

Hagen, J. M., & Simons, T. (2003). Differentiating trust in the Company from Trust in the Executive in Supply Chain Relations. Paper Presented at *The Academy of Management 2003 Annual Meetings*, Seattle,WA.

Hedlund, J., Ilgen, D., & Hollenbeck, J. (1998). Decision Accuracy in Computer-Mediated versus Face-to-Face Decision-Making Teams. *Organizational behavior and human decision processes*, *76*(1), 30–47. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/9756738.

Heidecke, F., & Back, A. (2009). A Reference Model for E-Collaboration within the Dispersed Sales Force Training Process in Multinational Companies. *International Journal of e-Collaboration*, Vol. 5 No. 1, pp. 32-46.

Heide, J.B. and G. John 1990, Alliances In Industrial purchasing The determinants of Joint Action in Buyer-Supplier Relationship, *Journal of Marketing Research* Vol. 27, pp. 24-36.

Hollingshead, A.B., and McGrath, J.E. (1995). Computer-assisted Goups: A Critical Review of the Empirical Research. In R.A. Guzzo, E. Salas, and associates (eds.), *Team Effectiveness and Decision Making in Organizations*. San Francisco: Jossey-Bass, pp. 46-78.

Horn, D., (2001). Seeing is Believing: Video Quality and Lie Detection. Ph.D. Thesis (Psychology), University of Michigan

Howorth, C., Westhead, P., & Wright, M. (2004). Buyouts, Information Asymmetry and the Family Management Dyad. *Journal of Business Venturing*, Vol. 19 No. 4, pp. 509-534.

Huin, S.F., L.H.S. Luong, L.H.S. and Abhary, K., (2002). Internal Supply Chain Planning Deter- minants in Small and Medium-Sized Manufacturers. *International Journal of Physical Distribution and Logistics Management*, Vol. 32 No. 9, pp. 771-782.

Hult, G., Thomas, M., Ketchen, D.J. Jr and Slater, S.F. (2004), Information Processing, Knowledge Development, and Strategic Supply Chain Performance, *Academy of Management Journal*, Vol. 47 No. 2, pp. 241-54.

Hussy, J. and Hussy, R, (1997). Business Research: A Practical Guide for Undergraduate and Postgraduate Students, (1st ed.), Macmillan Press Ltd.

Huxham, C. & Vangan, S. (2003). Researching Organizational Practice through Action Research. *Organization Research Methods,* Vol. 36, pp. 383-403

Iakovaki, A. A., Srai, J. S., & Harrington, T. (2009). Service Supply Chain Integration in Multi-organisation Network - Applying Integration Enablers and Aligning Process Capabilities, *14th Annual Cambridge Manufacturing Symposium*, pp. 24-25.

Ion Linton (2011). Five Differences Between Service and Manufacturing Organisation, accessed at http://smallbusiness.chron.com/five-differences-between-service-manufacturing-organizations-19073.html

Ireland, R. and Bruce, R. (2000). CPFR: Only the Beginning of Collaboration, *Supply Chain Management Review*, pp. 80

Ireland, R.D., Hitt, M.A., Webb, J.W., (2005). Entrepreneurial Alliances and Networks. In: Shenkar, O., Reuer, J.J. (Eds.), Handbook of Strategic Alliances. Sage Publications, Thousand Oaks, CA, pp. 333-352.

Ireland, R.D.,Webb, J.W., (2007). A multi-theoretic Perspective on Trust and Power in Strategic Supply Chains. *Journal of Operations Management*, Vol. 25, 482-497.

J. Harris and A. Zaheer. (2006). Interorganizational Trust. *Handbook of Strategic Alliances*, pp. 169-197.

John, G. (1984). An Empirical Investigation of some Antecedents of Opportunism in a Marketing Channel. *Journal of Marketing Research*, Vol. 21, pp. 278-289.

Johnson, P. & Cassell, C. (2001). Epistemology and Work Psychology: New Agendas. *Journal of Occupational and Organizational Psychology,* Vol. 74, pp. 125-143.

Johnston, D.A., McCutcheon, D.M., Stuart, F.I., Kerwood, H., (2004). Effects of Supplier Trust on Performance of Cooperative Supplier Relationships. *Journal of Operations Management*, Vol. 22, 23–28.

Jones, M. (2012). The Evolution of Digital Technologies - From Collaboration to eCollaboration. *Issues in Informing Science and Information Technology*, Vol. 9, pp. 209-219.

Kalof, L., Dan, A. and Dietz, T. (2008). Essentials of Social Research. McGraw Hill Open University Press.

Kaur, R. (1993). Managerial Styles in the Public Sector. *Indian Journal of Industrial Relations*, Vol. 28 No. 4, pp. 363-368.

Khan, K.B and Mentzer, J.T. (1996). Logistics and Inter-departmental Integration, *International Journal of Physical Distribution & Logistics Management*, Vol. 26 No. 8, pp. 6-19.

Kiesler, S., & Sproull, L., (1991). Connections: New Ways of Working in the Networked Organization. Cambridge, MA: MIT Press.

Kiesler, S., & Sproull, L., (1992). Group Decision Making and Communication. *Organizational Behaviour and Human Decision Processes*, Vol. 52, pp. 96-123.

Kim, P.H, Dirks, K.T., Cooper, Y.D. (2009). The Repair of Trust: A Dynamic Bilateral Perspective and Multilevel Conceptualization. *Academy of Management Review*, Vol. 34 No. 3, pp. 40-64.

Kim, W., (2009). Effects of Trust Mechanism on Complex Adaptive Supply Networks: An Agent-based Social Simulation Study. *Journal of Artificial Societies and Social Simulation,* Vol. 12 No. 3, pp. 4.

Klein, R., Rai, A., & Straub, D.W. (2007). Competitive and Cooperative Positioning in Supply Chain Logistics Relationships. *Decision Sciences,* Vol. 38, No. 4, pp. 611-646.

Kock, N., & Nosek, J. (2005). Expanding the Boundaries of E-Collaboration. *IEEE Transactions on Professional Communication,* Vol. 48 No. 1, pp. 1-9.

Kock, N., (2005). What is E-Collaboration? *International Journal of e-Collaboration*, Vol. 7, pp. 1-18.

Kramer, R. M. (1999). Trust and Distrust in Organizations: Emerging Perspectives, Enduring Questions. *Annual Review of Psychology*, Vol. 50, pp. 569-598.

Krauss, S. E. (2005). Research Paradigms and Meaning Making: A Primer. The Qualitative Report, Vol. 10 No. 4, pp. 758-770

Kwon, I.W. G., & Suh, T. (2004). Factors Affecting the Level of Trust and Commitment in Supply Chain Relationships. *The Journal of Supply Chain Management*, Vol. 40 No. 2, pp. 4-14.

Kwon, I.W.G., Suh, T. (2005). Trust, Commitment and Relationships in Supply Chain Management: A Path Analysis. *Supply Chain Management* Vol. 10, 26-33.

La Londe, B. (2002). "Who Can You Trust These Days?" *Supply Chain Management Review*, pp. 9-10

Laeequddin, M., Sardana, G.D., Sahay, B.S., Waheed, K.A. and Sahay, V. (2009), Supply Chain Partners' Trust Building Process Through Risk Evaluation: The Perspectives of UAE Packaged Food Industry, *Supply Chain Management: An International Journal,* Vol. 14 No. 4, pp. 280-90.

Lahno, B., (2002). Institutional Trust: A Less Demanding Form of Trust? Revista Latinoamericana de Estudios Avanzados (RELEA): Caracas.

Lambert, D. M., & Cooper, M. C. (2000). Issues in Supply Chain Management. *Industrial Marketing Management*, Vol. 29 No. 1, pp. 65-83.

Larson, A. (1992). Network Dyads in Entrepreneurial Settings: A Study of the Governance of Exchange Relationships. *Administrative Science Quarterly*, Vol. 37, pp. 76-104.

Lau, H.C.W., Lee, W.B., (2000). On a Responsive Supply Chain Information System. *International Journal of Physical Distribution & Logistics* Vol. 30 No. 7/8, pp. 598-610.

Laubacher, R.J., Malone, T.W., (1997). MIT Scenario Working Group. Two Scenarios for 21st Century Organizations Shifting Networks of Small Firms or all Encompassing 'Virtual Countries'?, Working Paper, 21 CWP (1).

Lee, A.S. (1994). Electronic Mail as a Medium for Rich Communication: An Empirical Investigation Using Hermeneutic Interpretation. *MIS Quarterly*, Vol. 18 No. 2, pp. 143-157.

Lee, H.L and Billington, C. (1992), Managing Supply Chain Inventory: Pitfals and Opportunities, *Sloan Management Review*, Vol. 33 No. 3, pp. 65-73.

Lee, H.L and Whang, S. (2000). Information Sharing in a Supply Chain, *International Journal of Technology Management,* Vol. 20 No. 3-4, pp. 373-87.

Li, W., Humphreys, P.K., Yeung, A.C.L., Cheng, T.C.E., (2007). The Impact of Specific Supplier Development Efforts on Buyer Competitive Advantage: An Empirical Model. *International Journal of Production Economics,* Vol. 106, pp. 230-247.

Lin, F., Sung, Y., Lo, Y. (2005). Effect of Trust Mechanism on Supply Chain Performance. *International Journal of Electronic Commerce,* Vol. 9 No. 4, pp. 91-112.

Luhmann, N., (1979). Trust and Power. Wiley, Chichester.

Lui, S.S. and Ngo, H.Y. (2004), The Role of Trust and Contractual Safeguards on Cooperation in Non-equity Alliances, *Journal of Management,* Vol. 30 No. 4, pp. 471-86.

Lurey, J.S., and Raisinghani, M.S. (2001). An Empirical Study of Best Practices in Virtual Teams. *Information and Management*, Vol. 38, pp. 523-544.

MacNeil, I.R. (1980), The New Social Contract, Yale University Press, NewHaven, CT.

McCarthy, T.M. and Golicic, S.L. (2002), Implementing Collaborative Forecasting to Improve Supply Chain Performance, *International Journal of Physical Distribution & Logistic Management*, Vol. 32 No. 6, pp. 431-54.

McCutcheon, D., Stuart, F.I., (2000). Issues in the Choice of Supplier Alliances Partners. *Journal of Operations Management* Vol. 18, 279-301.

McEvily, W., Perrone, V. and Zaheer, A. (2003), "Trust as an Organizing Principle", *Organization Science,* Vol. 14, pp. 92-103.

McGrath. (1984). A Typology of Tasks. 1st ed., pp. 12–165. New Jersey: Prentice Hall.

McIvor, R. and McHugh, M. (2000). Partnership Sourcing: An Organisation Change Management Perspective, *The Journal of Supply Chain Management,* Summer, pp. 12-20.

McLaren, T., Head, M., & Yuan, Y. (2002). Supply Chain Collaboration Alternatives: Understanding the Expected Costs and Benefits. *Internet Research*, Vol. 12 No. 4, pp. 348-364.

Malhotra, D., & Murnighan, J. K. (2002). The Effects of Contracts on Interpersonal Trust. *Administrative Science Quarterly*, Vol. 47, pp. 534-559

Maznevski, M.L., and Chudoba, K.M. (2000). Bridging Space Over Time: Global Virtual Team Dynamics and Eeffectiveness. *Organization Science,* Vol. 11 No. 5 pp. 473–492.

M.Eric Johnson and Seugin Whang. (2002). E-Business and Supply CHain Management : An Overview and Framework. *Production and Operation Management*, Vol. 11 No. 4, pp. 413-423.

Markus, M.L. (1994). Electronic Mail as the Medium of Managerial Choice. *Organization Science,*Vol. 5 No. 4, pp 502-527.

Maxwell, J. A. (2005). Qualitative Research Design: An Interactive Approach (Second Edition ed.): Sage Publications Inc.

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). Model of Trust, Vol. 20 No. 3, pp. 709-734.

Mayer, R.C & Davis, J. (1995). An Integrative Model of Organizational Trust.

Mayrhofer, D. and A. Back (2003). Workplace E-Collaboration Theoretical Foundations and Practical Implications, I*nstitute of Information Management*, University of St. Gallen: pp. 1-39.

Mehta, J. (2004). Supply Chain Management in a Global Economy, *Total Quality Management*, Vol. 15 No. 5/6, pp. 841-8.

Mentzer, J.T., Figgin, J.H. and Golicic, S.L (2000). COllaboration: The Enablers, Impediments and Benefits, *Supply Chain Management Review*, Vol. 3 No. 6, pp. 56-68.

Meredith, J. (1998). Building Operations Management Theory through Case and Field Research. *Journal of Operations Management*, Vol. 16, pp. 441-454.

Miles, M. B., and Huberman, A. M. (1994). Qualitative Data Analysis. Thousand Oaks: Sage publications.

Mingers, J. (2003). A Classification of the Philosophical Assumptions of Management Science Methods. *Journal of the Operational Research Society,* Vol. 54, pp. 559-570

Mitra, A., (2002). Trust, Authenticity and Discursive Power in Cyberspace. *Communications of the ACM,* Vol. 45 No. 3, pp. 27-29.

Mone, M.A., McKinley, W., Barker, V.L., (1998). Organisational Decline and Innovation: A Contingency Framework. *Academy of Management Review,* Vol. 23, 115-132.

Monk, A.F., Watts, L.A., (2000). Peripheral Participation in Video-Mediated Communication. *International Journal of Human Computer Studies,*Vol. 52, 775-960.

Moorman, C., Deshpande, R., & Zaltman, G. (1993). Factors Affecting Trust in Market Research Relationships. *Journal of Marketing,* Vol. 57, pp. 81-101.

Muckstadt, J.A., Murray, D.H., Rappold, J.A. and Collins, D.E. (2001), Guidelines for Collaborative Supply Chain System Design and Operations, *Information Systems Frontiers,* Vol. 3 No. 4, pp. 427-53.

Munkvold, B.E., and Zigurs, I. (2005). Integration of E-Collaboration Technologies: Research Opportunities and Challenges. *International Journal of E-Collaboration,* Vol. 1 No. 2, pp. 1-24.

Nesheim, T. (2001). Externalisation of the Core: Antecedents of Collaborative Relationshops with Suppliers, *European Journal of Purchasing and Supply,* Vol. 7, pp. 217-25.

Nunamaker, J.F.; Chen, M.; and Purdin, T.D.M. (1991). Systems development in Information Systems Research. *Journal of Management Information Systems,* Vol. 7 No. 3, pp. 89-106.

Oates, B. J. (2002). Co-operative Inquiry: Reflections on Practice. *Electronic Journal of Business Research Methods,* Vol. 1, No, 1, pp. 27-37

Ofstad, H. (1961), An Inquiry into the Freedom of Decision, Norwegian Universities Press, Oslo, Norway.

Olson, J.S., Olson, G.M., Meader, D.K., (1995). What Mix of Audio and Video is Useful for Small Groups Doing Remote DesignWork? *Proceedings of the CHI'95,* May 7-11, Denver, CO, USA, pp. 362-368.

Panayides, P., Lun, Y. (2009). The Impact of Trust on Innovativeness and Supply Chain Performance. *International Journal of Production Economics,* Vol. 122 No. 2, pp. 35-46.

Park, S.H. and Ungson, G.R. (2001). Inter-firm Rivalry and Managerial Complexity: A Conceptual Framework of Alliance Failure, *Organization Science,* Vol. 12 No. 1, pp. 37-53.

Popp, A. (2000). Swamped in Information, but Starvedod Data; Information and Intermeduarues in Clothing Supply CHains, Supply CHain Management, Vol. 5 No. 3, pp. 28-36.

Powell, A.; Piccoli, G.; and Ives, B. (2004). Virtual Teams: A Review of Current Literature and Directions for Future Research. *The Database for Advances in Information Systems*, Vol. 35 No. 1, pp. 6-36.

Qureshi, S., and Zigurs, I. (2001). Paradoxes and Prerogatives in Global Virtual Collaboration. *Communications of the ACM,* Vol. 44 No. 12, 85-88.

Rabinovich, E., Bailey, J.P., Carter, C.R., (2003). A Transaction Efficiency Analysis of an Internet Retailing Supply Chain in the Music CD industry. *Decision Sciences,* Vo. 34 No. 1, pp. 131-172.

Richard M. Cyert, H. A. S. and D. B. T. (1956). Observation of a Business Decision. *The Journal of Business*, Vol. 29 No. 4, pp. 237-248.

Rocco, E. (1998). Trust Breaks Down in Electronic Contexts but can be Repaired by Some Initial Face-to-face Contact. *Proceedings of the SIGCHI conference on Human factors in computing systems - CHI '98*, pp. 496–502.

Rocco, T. S., Bliss, L. A., Gallagher, S. and Prado, A. (2003). Taking the Next Step: Mixed Methods Research in Organizational Systems. Information Technology, *Learning and Performance Journal*, Vol. 21, No. 1.

Rogers, Y. (1994). Exploring Obstacles: Integrating CSCW in Evolving Organizations. *In Proceedings of CSCW '94*. Chapel Hill, NC: ACM Press, pp. 67-79.

Rohde, J., Meyr, H., Wagner, M., (2000). Die Supply Chain Planning Matrix, in: *PPS Management*, Vol.5 No. 1, pp. 10-15

Rowe, A. J., & Boulgarides, J. D. (1983). Decision Styles - A Perspective. *Leadership & Organization Development Journal*, Vol. 4 No. 4, pp. 3-9.

Roy, S., Sivakumar, K., Wilkinson, I.F., (2004). Innovation Generation in Supply Chain Relationships: A Conceptual Model and Research Propositions. *Journal of the Academy of Marketing Science*, Vol. 32 No. 1, pp. 61-79.

Saeed, K. a., Malhotra, M. K., & Grover, V. (2011). Interorganizational System Characteristics and Supply Chain Integration: An Empirical Assessment. *Decision Sciences*, Vol. 42 No. 1, pp. 7-42.

Sanders, N. (2007). An Empirical Study of The Impact of E-business Technologies on Organizational Collaboration and Performance. *Journal of Operations Management*, Vol. 25 No. 6, pp. 1332–1347.

Sapienza, H. J., & Korsgaard, A. (1996). Procedural Justice in Entrepreneur-Investor Relations. *Academy of Management Journal*, Vol. 39 No. 3, pp. 544-574.

Sarker, S., and Sahay, S. (2003). Understanding Virtual Team Development: An Interpretive Study. *Journal of the Association for Information Systems*, Vol. 4, pp. 1-38.

Seabright, M. A., Levinthal, D. A., & Fichman, M. (1992). Role of Individual Attachments in the Dissolution of Interorganizational Relationships. *Academy of Management Journal*, Vol. 35 No. 1, pp. 122-160.

Sengupta, K., Heiser, D. R., & Cook, L. S. (2006). Manufacturing and Service Supply Chain Performance: A Comparative Analysis. *The Journal of Supply Chain Management*, Vol. 42 No. 4, pp. 4-15.

Shackel, B., (1991). Usability—Context, Framework, Definition, Design and Evaluation. In: Shackel, B., Richardson, S. (Eds.), *Human Factors for Informatics Usability.* Cambridge University Press, Cambridge, pp. 21-37.

Sherman, S. (1992). Are Strategic Alliances Working?, Fortune, pp. 77-78.

Sheridan, J.H. (1999). Managing the Chain, *Industry Week*, Vol. 248, September, pp. 50-66.

Siegal, J., Dubrovsky, S., Kiesler, S., & McGuire, T. W. (1986). Group Processes in Computer-Mediated Communication. *Organizational Behavior and Human Decision Processes,* Vol. 37 No. 2 pp. 21-249.

Simatupang, T.M., Wright, A.C. and Sridharan, R. (2002). The Knowledge of Coordination for Supply Chain Integration, *Business Process Management Journal*, Vol. 8 No. 3, pp. 289-308.

Simatupang, T.M. and Sridharan, R. (2002a). The Collaborative Supply Chain, *International Journal of Logistics Management,* Vol. 13 No. 1, pp. 15-30.

Simatupang, T.M. and Sridharan, R. (2002b). Supply Chain Discontent: Sources and Remedies, *Supply Chain Management*: An International Journal.

Simatupang, T.M. and Sridharan, R. (2005). An Integrative Framework for Supply Chain Collaboration. *International Journal of Logistics Management,* Vol. 16 No. 2, pp. 257-274.

Simon, B. H. A., (1960). Making Management Decisions: The Role of Intuition and Emotion, *The Academy of Management Executive,* Vol. 1 No. 1, pp. 57-64.

Simon, B. H. A., (1987). Making the Role Management Decisions : and of Intuition Emotion Intuition and Judgment, Vol. 1 No. 1, pp. 57–64.

Short, J.; Williams, E.; and Christie, B. (1976). The Social Psychology of Telecommunications. New York: Wiley.

Srai, J. (2007). Developing a More Integrated Supply Network Through Process and Capability Alignment - An Initial Review of an Output-based Service Supply Chain Contract, Loughborough Conference.

Stephen P. Robbins et. al., (2006). Management 5th ed. Prentice Hall.

Stank, T.P., Dougherty, P.J. and Autry, C.W. (1999). Collaborative Planning: Supporting Automatic Replenishment Programs, *Supply Chain Management*, Vol. 4 No. 2, pp. 75-85.

Stank, T.P., Keller, S.B. and Daugherty, P.J. (2001), Supply Chain Collaboration and Logistical Service Performance, *Journal of Business Logistics*, Vol. 22 No. 1, pp. 29-48.

Stonebraker, P.W. and Afifi, R. (2004), Toward a Contingency Theory of Supply Chains", *Management Decision,* Vol. 42 No. 9, pp. 31-44.

Straus and McGrath. (1994). Does the Medium Matter? The Interaction of Task Type and Technology on Group Performance and Member Reactions. *Journal of Applied Psychology*, Vol. 79 No. 1, pp. 87-96.

Thomas Bateman and Scott Snell (2012). Management: Leading and Collaborating in Competitive World, 10th ed. McGraw-Hill Higher Education.

Togar, M.S. and Ramaswami, S. (2004). A Benchmarking Scheme for Supply Chain Collaboration, *Benchmarking: An International Journal*, Vol. 11 No. 1, pp. 9-31.

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. *British Journal of Management*, Vol. 14 No. 3, pp. 207–222.

Tucker, R., and Panteli, N. (2003). Back to Basics: Sharing Goals and Developing Trust in Global Virtual Teams. *In Proceedings of IFIP WG 8.2/9.4, Boston*: Kluwer Academic Publishers, pp. 85–98.

Vertegaal, R., Slagter, R., Van der Veer, G., Nijholt, A., (2001). Eye Gaze Patterns in Conversations: There is More to Conversational Agents Than Meets the Eyes. *Proceedings of the CHI 2001*, March 31–April 5, Seattle, WA, USA, pp. 301–308.

Voss, C., Tsikriktsis, N., and Frohlich, M. (2002). Case Research in Operations Management. *International Journal of Operations & Production Management,* Vol. 22, No. 2, pp. 195-219.

Wang, E. T. G., & Wei, H. L. (2007). Interorganizational Governance Value Creation: Coordinating for Information Visibility and Flexibility in Supply Chain. *Decision Sciences,* Vol. 38 No. 4, pp. 647-674.

Wang, Y. (2006). E-Collaboration - A Literature Review. In *Cardiff Business School, Cardiff University*, pp. 2-6.

Warkentin, M. E., Sayeed, L., & Hightower, R. (1997). Virtual Teams versus Face-to-Face Teams: An Exploratory Study of a Web-based Conference System. *Decision Sciences*, Vol. 28 No. 4, pp. 975-996.

Watson, R.T.; Bostrom, R.P.; and Kinney, S.T. (eds.), (1992). Computer Augmented Teamwork. New York, NY: Van Nostrand Reinhold.

Watson, A., Sasse, M.A., (1996). Evaluating Audio and Video Quality in Low-cost Multimedia Conferencing Systems. *Interacting with Computers,* Vol. 8 No. 3, pp. 255-275.

Whipple, J.M and Frankel, R. (2000). Strategic Alliance Success Factors, *The Journal of Supply Chain Management,* Vol. 36 No. 3, pp. 21-8.

Williams, L.R., Esper, T.L., Ozment, J. (2002). The Electronic Supply Chain: Its Impact on the Current and Future Structure of Strategic Alliances, Partnerships and Logistics Leadership. *International Journal of Physical Distribution and Logistics Management,* Vol. 32 No. 8, pp. 703-711.

Wilson, G.M., Sasse, M.A., (2000). Investigating the Impact of Audio Degradations on Users: Subjective vs. Objective Assessment Methods. *Proceedings of the OZCHI'2000,* December 4-8, Sydney, Australia, pp. 135-142.

Whittaker, S., O'Connail, B., (1997). The Role of Vision in Face-to-face and Mediated Communication. In: Finn, K.E., Sellen, A.J., Wilbur, S.B. (Eds.), *Video-Mediated Communication*. Lawrence Erlbaum, Mahwah, NJ, pp. 23-49.

Yin, R. K. (2003). Case Study Research: Design and Methods (3rd ed.). London: Sage Publications.

Young-Ybarra, C., & Wiersema, M. (1999). Strategic Flexibility in Information Technology Alliances: The Influence of Transaction Cost Economics and Social Exchange Theory. *Organization Science,* Vol. 10 No. 4, pp. 439-459.

Zaheer, A., & Venkatraman, N. (1995). Relational Governance as an Interorganizational Strategy: An Empirical Test of the Role of Trust in Economic Exchange. *Strategic Management Journal,* Vol. 16 No. 5, pp. 373-392.

Zaheer, A. McEvily, B. (1998). Does Trust Matter. *Organization Science,* Vol. 9 No, 2, pp. 141–159.

Zaheer, A., Lofstrom, S., & George, V. P. (2002). Interpersonal and Interorganizational Trust in Alliances. In F. J. Contractor & P. Lorange (Eds.), Cooperative Strategies and Slliances. London: Pergamon.

Zhang, M., Huo, B. (2013). The Impact of Dependence and Trust on Supply Chain Integration. *International Journal of Physical Distribution & Logistics Management,* Vol. 43 No. 7, pp. 544-563.

Zigurs, I., and Buckland, B. (1998). A Theory of Task Technology Fit and Group Support Systems Effectiveness. *MIS Quarterly,* Vol. 22, No. 3, pp.313-334.

Zigurs, I.; Buckland, B.; Connolly, J.; and Wilson, E.V.(1999). A Test of Task-Technology Fit Theory for Group Support Systems. *The Database for Advances in Information Systems,* Vol. 30 No. 3/4, pp. 34-50.

APPENDICES

APPENDIX I

Glossary of terms mentioned in The Developed Model

Table below clarify all terms used in the developed model with intention to give a clear meaning by each term. The following table provides these definitions:

No.	Terms	Definition
1.	Service Supply Chain	"Service Supply Chain is a network of inter-connected organisations that utilizes resources and transforms their inputs (skills and knowledge) into the service offering to enhance the delivery of a flexible customize solution" (A.Iakovaki, J.S Srai, 2009)
2.	Manufacturing Supply Chain	"Physical handling of a product, and the process that involved moving a product from supplier to customer"
3.	Operational Decision	Routine decision at operational level.
4.	Strategic Decision	Non-routine decision at strategic level.
5.	Routine Decision Activities	Programmed / Structured Decision.
6.	Non-routine Decision Activities	Non-programmed / unstructured decision.
7.	Complex Decisions	One that may be difficult to define and may significantly change in response to some solution; may not have a single "right answer"; has many interrelated causative forces; has no (or few) precedents; has many stakeholders and is often surprise prone.
8.	Simple Decisions	Single desired outcome and single solution scheme.
9.	Conceptual Style Decision-making	Refer Table 3.2
10.	Behavioural Style Decision-making	Refer Table 3.2

11.	Analytical Style Decision-making	Refer Table 3.2
12.	Directive Style Decision-making	Refer Table 3.2
13.	Negotiate (Cognitive Conflict Task Type)	Resolve conflict of interest.
14.	Choose (Intellective Task Type)	Solve problem with correct answers.
15.	Choose (Decision-making Task Type)	Decide issues with no right answer.
16.	Generate (Planning Task Type)	Generate plans.
17.	Generate (Creative Task Type)	Generate ideas.
18.	Level of Risk	A situation involving exposure to danger, harm or loss.
19.	Level of Urgency	How important the decision need to do fast.
20.	Attitudes towards Technology Adoption	Acceptance towards E-Collaboration Technologies.
21.	Location	Locality of the collaborate partners.
22.	Methods of Preferences	Favourite's communication methods, whether using Face-to-face or E-Collaboration Technologies.
23.	Trust Attributes	Factors that contribute to the successful of the collaboration initiative.
24.	Contextual Factors	Attributes of areas that derive from structural or social characteristics of the area.
25.	Social Factors	Refers to the facts and experiences that influence or control an individuals' personality, attitudes and lifestyle
26.	Efficiency of Collaborative Decision-Making	Working in a well-organized and competent way.
27.	Effectiveness of Collaborative Decision-Making	The degree to which something is successful in producing a desired result; success

28.	Trust Development in Collaborative Decision-Making	Trust growth during the decision-making process.
29.	Trust	"The willingness of a party based on the expectations that the other party will perform a particular action important to the trustor, irrespective of the ability to monitor or control the party".
30.	E-Collaboration Technologies	Collaboration among individuals engaged in a common task using electronic technologies.

APPENDIX II

PhD Research Thesis

Collaborative Decision-making in Supply Chains: The Impact of E-Collaboration Technologies on Efficiency, Effectiveness and Inter-Organizational Trust.

CASE STUDY PROTOCOL

Overview

This case study protocol has been developed to provide a structured approach to the collection and documentation of data to ensure reliability and validity. The aim of the research is to investigate and evaluate the process of collaborative decision-making using e-Collaborative Technology as medium of communication in Supply Chain. It is also to identify the impact of e-Collaborative Technology on level of trust; whether it can help or hinder trust development between collaborative organizations.

The data collected will be used to answer, empirically, the three research questions:

RQ 1: What are the types of collaborative decisions that are made in Supply Chain?

RQ 2: How does E-Collaboration Technology enable collaborative decision-making in Service Supply Chain and Manufacturing Supply Chain?

RQ 3: How can E-Collaboration Technologies gives Positive or Negligible (low) impact in inter-organizational trust development for Service Supply Chain and Manufacturing Supply Chain context?

Data is collected in the form of open-ended interviews as well as secondary documentation internally from the company and externally through academic documentations. The data collection and documentation process comprises of four stages, as in Figure 1 below. Each stage is explained in greater detail in the main body of the report.

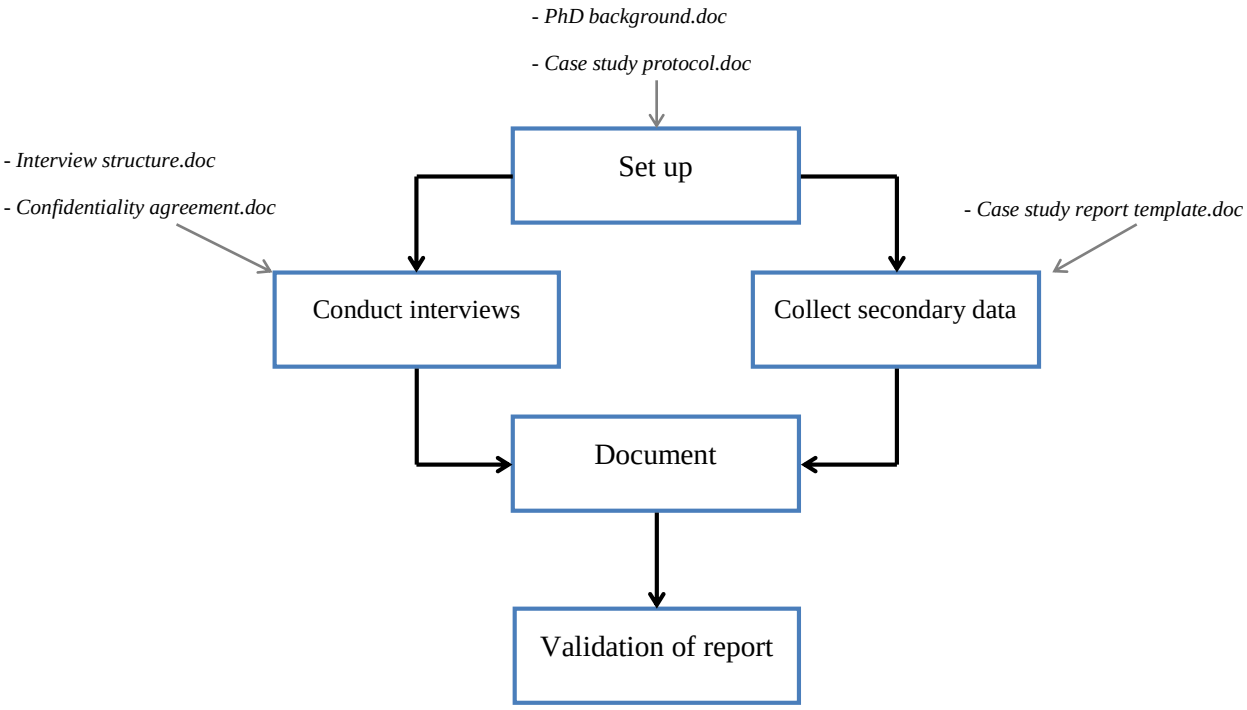


Figure 1: Phases of data collection and documentation

1.0 Set up

1.1 Identification and selection of case study project

The research is focused on collaborative decision as unit of analysis, thus potential cases must fulfil a number of criteria:

- The project must be a collaborative project involves several different organizations. Collaboration definition as suggested by Bititci et al (2004) is means seeking mutual benefits and working together towards a common aim.
- 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.
- The project must involve e-Collaboration Technology as a medium of communication in the decision-making process. Example of e-Collaboration Technology such as video conferencing, instant

messaging, online meeting tools etc. These include such activities as information sharing and integration, decision sharing, process sharing and resources sharing.

The research uses a combination of interviews and secondary data collection methods thus the company must be willing to make available relevant personnel for interview and provide researcher with relevant documentation.

1.2 Desk Research

On selection of a potential company, some desk research should be carried out in order to understand the company / project history and background, to determine if the company / project chosen has the requirement needed and to enable the interview strategy to be developed. This should begin with the company website and any other published sources of information that are freely available.

1.3 First Contact

Refer to PhD Background.doc. The aim of this is to introduce the research to the main contact in the company and arrange a face-to-face meeting to discuss the data collection process.

The initial meeting with the companies contact should cover the following points:

- **Interviewees**
  - Relevant personnel – Project Manager, Project Advisor, Project Members.
  - Timescales – approximately 1-2 hour per interview.

- **Confidentiality** - throughout the research confidentiality will be maintained both with the case study organization and the individuals participating in the interview. It is therefore important that the company contact and all others are ensured of this fact at the outset. A key point to emphasize is that ***data gathered from any individual person or the company will not be used in any way in any research report or publication that may incriminate them or identify them as an organization or an***

individual without their express permission". If required, a formal confidentiality agreement is available that can be amended and signed by the research team and the company or the individual concerned.

- **Overview of organization** – the objective here is to try to get a feel for the company in areas such as:
    - Brief history of the project - i.e. when did it starts, what sort of collaborative decision involves, types of technology adopted.
    - Project team - who involves, number of people, collaborated parties.
    - Products and services offered (past, present and future)
    - Information Communication Technology involve
    - Culture

- **Site visit / Join meeting –** to gain a greater understanding of the company's / project's operations and make some observations on such things as:
    - How organized and smoothly do things seem to run?
    - What is the atmosphere like – taking the chance to speak to people as the tour / observation progresses.
    - How is the process of communication through e-collaborative technology run?

2.0 Conduct Interviews

2.1 General

A open-ended interview approach is adopted for this research in order to allow the collaborative decision-making process stories to emerge. The guidelines listed below should be used as such, they are not a prescriptive set of questions but a series of prompts to guide an interviewee to discuss a certain topic or elaborate on specific points. It is necessary to ensure that each interviewee covers the general points in order to triangulate the data collected.

The interview strategy for each interviewee will vary depending on the data gathered through desk research and the interaction with other interviewees, however the guidelines should be followed to give a general scope to the discussions.

2.2 Interview Guidelines

Orientation:

i. Interviewee name, position in the project and main roles and responsibilities.
ii. Company / project size, age, previous project, etc.
iii. Overview or history of the company / project since the interviewee has been there.

Interview questions:

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?
   - How was the decision made?
3. What is the process?
4. What are the types of E- Collaboration Technologies involves in decision-making process? Do you use any electronic communication technologies to assist the collaborative decision-making in this area? What are they?
5. Do you think a better and faster decision would have been made with or without E- Collaboration Technologies? Why?
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?
7. How important do you think trust between members in this collaborative initiative and why?
8. Do you think E- Collaboration Technologies helps or hinder building trust?
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?

3.0 Collect secondary data

If the discussions refer to documentation from within the company that provides supporting evidence, request to see the documentation, and make a copy if allowed.

4.0 Document

4.1 Interview notes

Following the interview use any written notes and the digital recordings to produce a mind map of the discussions in the words and connections of the interviewee. Additional thoughts can be added as a separate branch and should be identified as such.

4.2 Case study report

The case study report should be written according to the template (Case study report template.doc) and based upon the interview notes.

5.0 Validity

On completion of the case study report, it should be emailed to the main contact at the company for validation. It is their choice as to whether it can be passed around all interviewees, but request that this happens. If any comments are returned suggesting changes, ensure that they do not contradict the evidence from the interviews. If not, update the report and agree completion with the company contact. If the feedback contradicts evidence from the interviews, discuss this with the company contact in order to reach consensus as to the accurate reflection of the business.

APPENDIX III

CASE STUDY REPORTS

CASE STUDY 1

1.0 Introduction

The following report is a summary of information gathered from a set of interviews and discussions at CS 1 between November and December 2011. Two members of the organization participated as details below:

Case Study	Company Name	Interviewees	Date	Durations
CS 1 Decision on a non-performing partner	Strathclyde University (UK) Tsunami (Ireland)	Project Director Project Manager	11/11/2011 2/12/2011	1 ½ hour 1 ½ hour

The report is focused on the information gathered regarding the adoption of E-Collaboration Technologies in their collaborative decision-making process. It also to identify the impact of any kind of E-Collaboration Technologies they are using towards efficiency, effectiveness and the trust development between the collaborated partners.

2.0 Case Study Overview

Case Study 1 involved two collaborated partners from UK and Ireland. Tsunami is a company based in Ireland. It is a leading company in setting up and delivering collaboration projects throughout the EU. Based in Ireland, Tsunami specializes in R&D projects, company transformation, environmental sustainability and audio-visual technology. University of Strathclyde, Glasgow involves in the research part of this project including develop engagement with all of the project's partners. CS 1 involved Project Manager from Tsunami and Project Director from University of Strathclyde as the key decision-makers.

Collaborative decision-making involved in CS 1 was about issue to eliminate a non-performance partner who was not able to deliver the outcome that has been agreed in the contract earlier. There were several processes involved before the final decision has been made and E-Collaboration Technology becomes the method of communication among the group members across Europe. At earlier stage of this problem, the strategic group members were discussing the issue in face-to-face meeting to collect all the evidences and then did the follow-up meeting via online tools. Finally, after several discussions, they took the decision to stop working with the non-performing partner, and the final decision was made via GoToMeeting. All of the participants in this decision process agreed that using E-Collaboration Technology able to speed up the decision-making process and had ability to help to come out with the best decision. The reason was because, online tools was the quickest way to get them together, more focus and the discussion process went through smoothly without other person talking about other matters. Trust factors built up quickly after there were face-to-face meeting beforehand and it able to support the final decision eventually.

3.0 Nature and category of decision

CS 1 is a strategic level, non-routine decision and it is under Conceptual style decision making and categorized under Cognitive Conflict task types. A non-routine decision is a nonprogrammable and unique, based on the certain circumstances and issue that arrive and needs special attentions from the decision-maker. Decision-making in CS 1 involved all members from steering committee to participate in giving opinion and feedback regarding the issue of non-performing partner in the collaborative initiative.

4.0 Contextual Factors

With respect to ***level of risk***, CS 1 is a high risk types of decision where all committee members that participated in making decision needs to consider feedback and opinion from each and every team members working in the collaborative project in order to make sure they make the right decision. The process of making decision was made through GoToMeeting as well as having a face-to-face discussion since the committee members were remotely located across Europe.

The level of urgency of CS 1 is a high level of urgency types of decision. This is because they need to find the replacement of the eliminated partner in order to ensure the task can be done on time and moreover, it also involved budget allocation and funding issues.

Location is one of the contextual factors that important in the nature of the collaborative project involved in CS 1. It is a geographically dispersed across Europe and the team members are remotely located.

Attitudes towards technology adoption, since the nature of the steering committee members that were remotely located, most of the discussion involved in making decision in CS 1 was done through online meeting. The acceptance towards using communication technology to make important decision is more open and this helps them to make faster and efficient discussion towards the issue. The Project Manager and Project Director agreed that using E-Collaboration Technology able to expedite the decision-making process.

5.0 Social Factors

With regards to the ***preferences*** to medium of communication, according to the opinion given from Project Director and Project Manager whom became the most important member in steering committee group, the preferences of using E-Collaboration Technology and face-to-face methods in making important and high-risk decision have its own needs. Since the nature of the project is geographical separated, E-Collaboration Technology has given so much impact in making the process of decision quicker and effective. This project started on 2009 and along the way of collaborative initiative, the team members had meeting each other beforehand and they already had established a relationship between them. This factor also contribute to the willingness and openness of using communication technology as a medium of communication even in the serious discussion and making a high-risk decision as in CS 1.

In conjunction with collaborative initiatives, ***trust attributes*** is vital to ensure the trust development between organizations and the people inside the organization established. As in CS 1, the representatives Project Director and Project Manager come out with some points that helping in trust development along the process of making decision. According to the Project Manager, certain amount of knowing the past performance of the team member is one of most important element in building trust.

6.0 Impact of Technology

With respect to the technology adoption towards ***efficiency*** of collaborative decision-making, the usage of E-Collaboration Technology gave Positive impact in the collaborative decision making process. Technology's roles helps the team to manage information and at the same time making fast decision. As agreed by the Project Manager, to achieve the result of technology adoption efficiency, in this case it is still related with the factors of trust where the trust background is somehow needed in order to develop further bonding in collaboration.

Impact of technology towards ***effectiveness*** in making collaborative decision-making was also being observed and the result is it gives Positive impact in the decision-making process. This condition resulted from the geographical and temporal distance between the main decision-makers that made they prefer to use E-Collaboration Technology as a medium of making fast, yet right decision.

With regards to the impact of technology towards ***trust development,*** it gives Positive impact where this result means the adoption of E-Collaboration Technology able to help them making collaborative decision. Most of the decision-maker in this specific decision agreed that the nature of the geographical dispersed among the project members is the main reason why they opted to used E-Collaboration Technology as a medium of communication. However, trust have been built beforehand in the face-to-face meeting before the project started, this condition support the trust development during the process of making decision electronically.

7.0 Concluding remarks

CS 1 can be seen as one of the successful story of using E-Collaboration Technology as a method of communication, specifically in making strategic decision. The key decision-makers in CS 1 are mainly working in the high technology environment which affect their acceptance of using E-Collaboration Technology as a way of communication methods with regards to remote locations between them. The preferences of using both conventional and E-Collaboration Technology as a way of communication resulted from the types of specific issues they would like to decide on. Knowing the partner's performance in other projects and knowing the team members of collaboration beforehand were some of the important points before doing collaborative decision-making in CS 1. E-Collaboration Technology give Positive impact on efficiency and effectiveness of collaborative decision-making. E-Collaboration Technology able to help key decision-makers in CS 1 to do collaborative decision-making as it give Positive impact in terms of trust development.

CASE STUDY REPORTS

CASE STUDY 2

1.0 Introduction

The following report is a summary of information gathered from a set of interviews and discussions at CS 2 between December 2011 and February 2012. Two members of the organization participated as details below:

Case Study	Company Name	Interviewees	Date	Durations
CS 2 Decision on development of 'Adaptive Capability Model.'	Strathclyde University (UK) Tsunami (Ireland)	Content Project Manager I Content Project Manager II	10/12/2011 13/2/2012	1 ½ hour 1 ½ hour

The report is focused on the information gathered regarding the adoption of E-Collaboration Technologies in their collaborative decision-making process. It also to identify the impact of any kind of E-Collaboration Technologies they are using towards efficiency, effectiveness and the trust development between the collaborated partners.

2.0 Case Study Overview

Case Study 2 involved two collaborated partners from UK and Ireland. Tsunami is a company based in Ireland. It is a leading company in setting up and delivering collaboration projects throughout the EU. Based in Ireland, Tsunami specializes in R&D projects, company transformation, environmental sustainability and audio-visual technology. University of Strathclyde, Glasgow involves in the research part of this project including develop engagement with all of the project's partners. CS 2 involved Content Project Manager II from Tsunami and Content Project Manager I from University of Strathclyde as the key decision-makers and members in Technology Board.

The Technology Board responsible for the contents of the portal and business model development and it includes most project partners across Europe. This group only had face-to-face meeting every three months and other communications were held using online tools. There was collaborative decision-making in developing the content for the portal and one of them was decision about where the content was best placed in which category. The communication about this decision was mainly using E-Collaboration Technology while most of the project members involve in this task were located across Europe. However, in the process of discussion and making collaborative decision, issues on different language and misinterpretation become the problem in the situation of having online meeting in a large group of members. The participant in this group agreed that making collective decisions were effective using E-Collaboration Technology but it should be done in a small group of people. It will be resulted to trust development among the partners on what they should delivered for the task specifically.

3.0 Nature and category of decision

CS 2 is an operational level, routine decision and it is Behavioural style decision-making and categorized under Intellective task types. This decision was discussing about the development of the 'Adaptive Capability Model' for the portal where it includes the application development and to decide on where the contents were best placed. In this decision, there were Technology Board members consist of adaptive capability content manager and some other sub-tasks manager such as in the area of innovation, organizational learning, change management and resilience that responsible to manage the information and to do decision-making.

4.0 Contextual Factors

With respect to ***level of risk,*** CS 2 is a low risk decision. The decision dealt with arranging the information to be placed in the portal, developing the applications and making sure to put the content at the best place whether in 'operational capability' or 'adaptive capability' area, it also require rich information. It was a non-routine process

and decision made using several e-collaboration technologies such as email, Skype and GoToMeeting.

The ***level of urgency,*** CS 2 categorize in low level of urgency types of decision. In this condition, the decision only dealt with the specific area which is 'adaptive capability' and the selections of best contents only consider within this area. The team members took the process of making decision together and getting the consensus agreement before making the final outcomes. This was because to avoid misunderstanding and putting the content into a wrong placement in the portal.

Location is one of the contextual factors that important in the nature of the collaborative project involved in CS 2. The team members were geographically dispersed across Europe and they were remotely located.

Attitudes towards technology adoption, since all the team members that involved in making this specific decisions were remotely located across Europe, they all agreed that using e-technology was the quickest way to get the decision done, hence, it can be used across the boundaries, able to share documents, files and information and moving faster. The acceptance towards using technology is more open.

5.0 Social Factors

Preferences, is measurement for the medium of communication that preferable to be used in the process of making decision. The nature of communication style between the team members were rarely done by face-to-face or at least in three months at the very most because of the geographical dispersed. They took the opportunity to use GoToMeeting for weekly online meeting and follow up discussion through email.

With regards to the ***trust attributes,*** the most important point in this specific decision-making is knowing the past and current partner's performance and knowing the collaborative partners beforehand. Since they had assigned some different tasks to every team members, the capability and ability of the team members are most important to deliver the outcomes. The Content Manager need to make sure that everybody is knowing their task and where the content should be best placed in the portal.

6.0 Impact of Technology

With respect to the technology adoption towards ***efficiency*** of collaborative decision-making. In CS 2, most of the communication was held using email and e-meeting facilities and it gives Positive impact towards assisting the decision-making process. This is because of the location and mobility of team members. They agreed that using E-meeting technology able to speed up their progress. However, there were some issues occurred during the process of making collaborative decision using GoToMeeting. Technical issues are something that needs to take into account when dealing with technologies. In this situation, some technical issues had happened during the e-meeting such as slow internet connection that caused delay in the electronic conversation. In some other occasions, there were technical problem during log on to GoToMeeting and it takes time to make sure everybody involved in the meeting comfortable with the video and sound quality.

Dealing with the ***effectiveness*** of collaborative decision-making with adoption of E-Collaboration Technology, fast and wise decision has been made through GoToMeeting, it gives Positive impact. The geographical dispersed among the team members is the main reason why they chose to use E-Collaboration Technology as main communication methods. As mentioned by the Content Manager, E-Collaboration Technology is more suitable to be used in small group to discuss and make decision rather than in a big group members. The decision-making process more smoothly and effective while they were discussing in a small group members.

With regards to the impact of technology towards ***trust development,*** it gives Positive impact towards collaborative decision-making. The Content Manager in CS 2 agreed the most important factor that built the trust development is meeting the project members before the collaboration started. Since some of the members knowing each other, the trust development built up quickly and this scenario helps them to make wise decision together.

7.0 Concluding remarks

CS 2 is one of the positive story of adopting E-Collaboration Technology for non-routine decision category, low level of risk and low level of urgency types of decision. The team members in CS 2 were mainly the portal content developers where most of their time was working with the computer software and systems. They shows a more open attitudes towards technology adoption with regards to the partner's remotely located across Europe. The preferences of using both face-to-face and E-Collaboration Technology as a methods of communication was mainly impact from the meeting style they have had in the team, where they will be having a face-to-face meeting every three months and most of the time has been assisting by the GoToMeeting e-meeting technology. Knowing the project team members beforehand, and identifying the past and current partner's performance are prerequisite in trust development attributes in CS 2. The impact of technology of CS 2 resulted to high impact of efficiency and high impact of effectiveness. E-Collaboration Technology give Positive impact towards trust development on assisting the collaborative decision-making in CS 2.

CASE STUDY REPORTS

CASE STUDY 3

1.0 Introduction

The following report is a summary of information gathered from a set of interviews and discussions at CS 3 between October 2011 and February 2012. Two members of the organization participated as details below:

Case Study	Company Name	Interviewees	Date	Durations
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

The report is focused on the information gathered regarding the adoption of E-Collaboration Technologies in their collaborative decision-making process. It also to identify the impact of any kind of E-Collaboration Technologies they are using towards efficiency, effectiveness and the trust development between the collaborated partners.

2.0 Case Study Overview

Case Study 3 involved three collaborated partners from UK and Czech Republic. Simply Collaboration and University of Strathclyde are companies that based in UK. Simply Collaboration is a company that expert in design and implementing business processes across supply chains. University of Strathclyde, Glasgow involves in the research part of this project including develop engagement with all of the project's partners. Technical University of Ostrava involve as a research partner and managing

SMEs from Czech Republic. CS 3 involved IT Project Manager from Simply Collaboration, Project Manager from University of Strathclyde and Project Coordinator from Technical University of Ostrava as the key decision-makers. They are also members in Technology Board of this project.

The Technology Board members are the one who responsible to manage and handle the development of the project. One of them who responsible to make key decision is the IT Manager who managed most of the architecture, support and programming part. The collaborative decision-making involved in CS 3 was a decision about changing the web content management system from a software called 'Drupal' to 'Sitefinity' because of compatibility and technical issue. This decision was quite complex as it involved many departments who manage different parts of the portal development. Some technical issue with one of the partner also occurred during the process of developing the portal that lead to the decision to change the software platform. Most of the discussions with other Technology Board members across Europe using GoToMeeting but because of geographical dispersed among them, some technical issues difficult to be discussed online rather than face-to-face meeting. Language barrier also become one of the obstacles to face during online meeting, this is because some of the partners are not a native English speakers. In term of trust development, the key attribute to build trust is to know current and past performance of the partner who responsible to deliver the outcomes, since CS 3 involved technical part, the partner's skills and ability are most important thing to put into considerations.

3.0 Nature and category of decision

CS 3 is a strategic, non-routine decision and it is an Analytical style decision-making and categorized under Decision-making task types. The collaborative decision focused on technical issues in content management system; changing the platform from one software to a new one because of the compatibility issue. The Technology Board members responsible to make decision with regards to the partner's feedback and outcome on the technical issue.

4.0 Contextual Factors

With regards to ***level of risk,*** CS 3 is a high risk decision. There was some technical issue with important partner who cannot deliver the outcome as agreed. They supposedly to manage the portal but after few months they delivered nothing. Since some other partner did not have the required skills, they decided to change the platform from 'Drupal' to 'Sitefinity' where they have more expertise in it. It was such a high risk decision they took to start with all over again with the portal, however to avoid from things getting worst, the collaborative decision has been taken. The decision to use 'Sitefinity' was because it is easy to use with the end user and because it able to integrate with all other stuff that the developers had done before in the project.

To deal with the ***level of urgency,*** CS 3 is a high urgency level decision. The decision was dealing with technical capability offers by the project partners, but in the middle of portal development, they cannot deliver the outcomes. The urgency to make decision together by the Technology Board was vital in order to make sure the progress can be proceed accordingly.

Location, the team members were remotely located across UK and Europe. In term of communication, most of them were using GoToMeeting and email for discussion and as well as face-to-face meeting.

Attitudes towards technology adoption, most of the team members in CS 3 are the person who technology literates because of their job nature in IT environment itself. In terms of attitudes towards technology adoption in collaborative decision-making, they are more open to communicate and make discussion through online meeting.

5.0 Social Factors

In terms of ***preferences,*** the CS 3 IT Manager agreed that using online technology able to help the team members to communicate very well during the process of portal development, but in terms of the specific decision in CS 3, surprisingly the IT Manager said that online meeting was actually not helping much in making collaborative decision because of the complicated nature of the decision itself.

With respect to ***trust attributes,*** the most important trust attributes as mentioned by the Project Manager and IT manager in this collaborative project are knowing the past and current partner's performance. This is because some of the project partners never collaborate or working together before. Knowing their success and failure story with their previous project is vital in order to choose the best partners to work together.

6.0 Impact of Technology

With respect to the technology adoption towards ***efficiency*** of collaborative decision-making, CS 3 gives Positive impact result. This condition resulted from the facilities offered by the E-Collaboration Technology they used to assist the communication process between remote location's partners.

With regards to ***effectiveness*** of collaborative decision-making in adopting E-Collaboration Technology, surprisingly the result is Negligible impact on effectiveness. The notion that can be concluded from this scenario is because of the complexity and difficulty towards making the collaborative decision for this specific issue. The person who responsible and understand most of the technical part of this issue suggested to have face-to-face meeting with other partners who have expertise in their specific tasks. The decision taken in CS 3 is quite risky since it involves on changing the platform of the portal. However, he agreed that the follow up actions best to use E-Collaboration Technology.

To deal with impact of technology towards ***trust development***, the result is Negligible impact. The IT Project Manager has mentioned that in CS 3 there was issues around language among the Technology Board members; this is because of the multi-cultural members involved in the collaborative project that somehow give Negligible impact on building trust initially.

7.0 Concluding remarks

CS 3 is one of the unique case in e-collaboration adoption for routine decision category with high level of risk and high level of urgency types of decision. It was a decision about changing the portal platform from a previous software to a new one because of the compatibility issue. Team members in CS 3 are mostly a set of people who having

high IT literacy. This is because of their job task and environment are related with the computer system development. Because of this factor, they have an open attitudes towards technology adoption with regards to their remotely located. However, surprisingly, although most of the CS 3 team members are IT literate (because of their job task and working environment which related to computer system development), their preferences of making collaborative decision-making was mainly conventional methods, which is face-to-face and not via E-Collaboration Technology. This condition resulted from the complication and difficulty of the issue arose in CS 3 where it is somehow impossible to achieve final decision if the discussion about the issue done through e-meeting facilities.

The impact of technology towards CS 3 is high on efficiency but low on effectiveness. The E-Collaboration Technology able (efficiency) to help them in terms of information transaction but not in terms of methods of communication (effectiveness). With this situation, CS 3 got Negative impact on trust development as e-collaboration might hinder them to do collaborative decision-making.

CASE STUDY REPORTS

CASE STUDY 4

1.0 Introduction

The following report is a summary of information gathered from a set of interviews and discussions at CS 4 between October 2011 and February 2012. Two members of the organization participated as details below:

Case Study	Company Name	Interviewees	Date	Durations
CS 4 Decision on development of logo and design.	Strathclyde University (UK) Simply Collaboration (UK)	Content Project Manager I & Project Director IT Project Manager	28/11/2011 11/11/2011 3/2/2012	1 ½ hour 1 ½ hour 1 ½ hour

The report is focused on the information gathered regarding the adoption of E-Collaboration Technologies in their collaborative decision-making process. It also to identify the impact of any kind of E-Collaboration Technologies they are using towards efficiency, effectiveness and the trust development between the collaborated partners.

2.0 Case Study Overview

Case Study 4 involved two collaborated partners, they are Simply Collaboration and University of Strathclyde that based in UK. Simply Collaboration is a company that expert in design and implementing business processes across supply chains. University of Strathclyde, Glasgow involves in the research part of this project including develop engagement with all of the project's partners. CS 4 involved IT Project Manager from Simply Collaboration and Project Director together with Content Project Manager I from University of Strathclyde as the key decision-makers and members in Technology Board.

Collaborative decisions involve in Case Study 4 (CS 4) involved task in designing the web portal and deciding on the most suitable project logo. There was an issue on who should do the design, which design should be chosen and how will it look eventually. Most of the conversation didn't work online while it involved discussion on creative and artistic solution and brainstorming was needed in the decision process. Participant in this group agreed that creative decision such as deciding on color schemes, fonts and graphic design were most working by having face-to-face meeting, as it was more interactive. However, in the process of making collaborative decision about logo design, online voting system was chosen as the method of decision-making process. Trust played a key role in this process because the voting system requires some transparent approach in order to get the best result.

3.0 Nature and category of decision

CS 4 is a strategic, non-routine decision under Conceptual style decision-making and categorized under Planning task types that requires creative and artistic problem solving. The collaborative decision in CS 4 focus on designing the portal as well as deciding on the best logo for the project. Collaborative decision involves in CS 4 including website design, look and feel, logo, color scheme and content. There are three main key decision-makers in CS 4; Project Content Developer cum Project Coordinator and Project Director.

4.0 Contextual Factors

Level of risk, CS 4 is a low risk decision. The decision on choosing the best website designer has been decided collectively by the main key decision-makers in this project. There were some options to considers based on the company portfolios. Eventually, the Technology Board members choosing an internal graphic designer from the university as their main designer for the portal. Since they had worked together before in other project, relationship between developer and designer has been well established. This become the main factor of low risk decision.

With regards to ***level of urgency,*** CS 4 is in low urgency decision category. The collaborative decisions on choosing the best project logo design took part by placing a voting system which was not taking long time to get the decision. Meanwhile, for

website design, the Technology Board members decided to use internal designer from university who has the right skill to do the job.

In terms of ***location,*** the team members involves in CS 4 are remotely located across Europe. Most of the communication were held through email and GoToMeeting at the early stage of the project and face-to-face after that.

Attitudes towards technology adoption, the result turns to be more open on accepting E-Collaboration Technology as their medium of communication. Most of the discussion going through email and GoToMeeting except for the decision that involves artistic ideas and creativity which happens to be preferably face-to-face.

5.0 Social Factors

In CS 4, the key decision makers agreed that ***preferences*** in using conventional methods like face-to-face is more preferable apart from using E-Collaboration Technology as their medium of communication. This condition is mostly apply in deciding on website design since it involves creative ideas and tasks. While in the process of choosing the best project logo, online voting system became the channel for key decision makers since it can be said as simple decision to be made.

Meanwhile, for decision in choosing the best project logo, the process going through online voting system as mentioned by the Project Content Developer;

With regards to ***trust attributes,*** based from the interview, the main trust attributes that important in CS 4 are the ability of the partners to produce the task and partner's past performance. In website design task, the ability of internal graphic designer has been proven by their current and previous project with university. In some extends, the trust relationship has been built up and proven.

6.0 Impact of Technology

With respect to the technology adoption towards ***efficiency*** of collaborative decision-making, the result showed Positive impact. Most of the discussion about choosing the best project logo held through email and GoToMeeting as well as online voting system. The facilities offered by these e-collaboration technologies able to help team members made fast and accurate decision.

Meanwhile in the perspective of making collaborative decision for graphic designing, the key decision-maker had mentioned that the task involved creative thinking and artistic design, so he would prefer the team members discuss via face-to-face with the graphic designer.

In the context of impact on E-Collaboration Technology towards ***effectiveness*** of collaborative decision-making, the result indicates Negligible impact on effectiveness. However, in the context of CS 4, this scenario is significant with the types of collaborative decision where it involves creative and artistic thought. As mentioned in the impact on efficiency, the results shows that it does has Positive impact towards efficiency but Negligible impact on effectiveness. In some points, the E-Collaboration Technology is useful in helping the team members to quicken the follow up process but not in terms of assisting them as a medium of communication.

In relations to ***trust development,*** the result from interview shows that E-Collaboration Technology give partly Negative impact on trust development. In some extends, one of the key decision-maker agreed that online tools able to help to build trust but since some of the project team members had known each other beforehand, it become easier for the trust development. However, she agreed that it is not necessary for the project team members to meet face-to-face beforehand to build trust but it helps.

7.0 Concluding remarks

CS 4 is one of the unsuccessful story of adopting E-Collaboration Technology in a routine decision category, low level of risk and low level of urgency but involve creative thinking decision. CS 4 has more open attitudes towards technology adoption. The team members who worked in this specific decision were the graphic designer and content developer and they are partly co-located and partly remote in location. A collaborative decision in CS 4 involve creative and artistic thinking where they are making decision on designing the web-portal skin, including color scheme, fonts choosing and placing the contents. This condition effect the way of communication preferences where they prefer both conventional and E-Collaboration Technology. CS 4 has high impact on efficiency but low impact on effectiveness. The E-Collaboration Technology able to assist them on follow up discussion but not in terms of making

creative decision process. Resulted from that, the trust development is in Negative side as E-Collaboration Technology might not helping them to do collaborative decision-making.

CASE STUDY REPORTS

CASE STUDY 5

1.0 Introduction

The following report is a summary of information gathered from a set of interviews and discussions at CS 5 between October 2011 and February 2012. Two members of the organization participated as details below:

Case Study	Company Name	Interviewees	Date	Durations
CS 5 Decision on development of portal 'Wheel' design.	Strathclyde University (UK) Simply Collaboration (UK)	Content Project Manager I IT Project Manager	11/1/2012 3/2/2012	1 ½ hour 1 ½ hour

The report is focused on the information gathered regarding the adoption of E-Collaboration Technologies in their collaborative decision-making process. It also to identify the impact of any kind of E-Collaboration Technologies they are using towards efficiency, effectiveness and the trust development between the collaborated partners.

2.0 Case Study Overview

Case Study 5 involved two collaborated partners, they are Simply Collaboration and University of Strathclyde that based in UK. Simply Collaboration is a company that expert in design and implementing business processes across supply chains. University of Strathclyde, Glasgow involves in the research part of this project including develop engagement with all of the project's partners. CS 5 involved IT Project Manager from Simply Collaboration and Content Project Manager I from University of Strathclyde as they key decision makers.

CS 5 involves in collaborative decision about developing the portal 'wheel' development. The terms 'wheel' in CS 5 refer to a graphic figure where the web portal

contents are display nicely in the ‘wheel’. It has a menu on the website to find various contents and user can use the ‘wheel’ to find the required information. Collaborative decision-making in CS 5 was specifically deal with the collaboration between Project Content Developer and the Graphic Designer as well as the IT Manager who responsible in the technical part. The communication process between the project team members in CS 5 was mainly using GoToMeeting besides face-to-face meeting as a supplement with the internal partners. However, the face-to-face meeting was preferable since the tasks involve in CS 5 needs in-depth discussion and the key decision-maker agreed that conventional method was good to cover many agendas in the meeting. For the part of trust development, the key decision-maker mentioned that it was a lot of easier for them to trust the internal partner since they have the history of working together and some of other project team members had been meeting beforehand.

3.0 Nature and category of decision

CS 5 is an operational decision under Conceptual style decision-making and categorized under Creative task types that requires creative and artistic problem solving. The collaborative decision discussed in CS 5 was about developing the graphic figure which looks like a ‘wheel’ design to make it more interactive with end users to find information in the web portal.

4.0 Contextual Factors

Level of risk, CS 5 is a low level of risk decision. The graphic designer who responsible to deliver the concept design was an internal partner who worked with the university. In terms of relationship establishment, it has been a good relationship between the project members. They risk of making collaborative decision upon this issue was somehow quite a smooth process where the designer did the concept that already been developed by the Content Project Manager and they come out with some ideas and the content manager presented that to the Technology Board. After choosing the best design for the ‘wheel’, the graphic designer developed it further until came out with the end product.

Level of urgency, CS 5 is a low level of urgency decision. The collaborative decision in this specific task has been decided in the early phase of the project. The follow up process was on designing the 'wheel' and put the appropriate contents on the right place.

With regards to ***location,*** the project team members in CS 5 were remotely located across Europe except for the Content Project Manager and the Graphic Designer who situated in the same organizational. Most of communication were using GoToMeeting, email and SharePoint.

Attitudes towards technology adoption, the results from the interview shows that most of the key decision-makers were comfortable with using E-Collaboration Technology as a medium of communication. This situation mostly related with the geographical dispersed among them and in order to avoid travelling cost and time consuming.

5.0 Social Factors

With regards to the ***preferences,*** CS 5 IT Project Manager agreed that using online technology able to help the team members to communicate very well. However, from the Content Project Manager point of view, she mentioned that using online tools actually make the process complicated as you didn't see exactly the people you interact with.

In terms of ***trust attributes,*** most of the key decision-maker in CS 5 agreed that things that need to be focused as trusted point in the collaboration are partners past experience as well as past performance of people and the organization itself.

6.0 Impact of Technology

With respect to ***efficiency,*** it shows that collaborative decision-making in CS 5 has Positive impact on adopting E-Collaboration Technology. However, the efficiency applied with regards to the facilities offered by online tools; quicker and faster to gather people in online meeting. Since the project team members in CS 5 were remotely located, online tools was the best way to communicate.

To mentioned on ***effectiveness,*** the results from interview shows Negligible impact on effectiveness. This condition means that adopting E-Collaboration Technology solely

to make collaborative decision-making was not strong enough to help the team members come out with an effective decision. Face-to-face method is strongly agreed to be used to support the communication and making collaborative decision eventually.

In relation to ***trust development,*** results from the interview shows Negative impact. The Content Project Manager II mentioned that she prefer to have the physical presence during the process of making decision collaboratively. Since most of her tasks involve with the internal graphic designer, to do face-to-face meeting is possible since they are working in the same organization;

The IT Project Manager has mentioned that in CS 5 there was issues around language among the Technology Board members; this is because of the multi-cultural members involved in the collaborative project that somehow give negative impact on building trust initially.

7.0 Concluding remarks

CS 5 is a case that unable to fully use the E-Collaboration Technology in their collaborative decision-making. CS 5 is a routine decision, low level of risk and low level of urgency types of decision. The collaborative decision in CS 5 involves a decision about developing an interactive figure called 'Wheel' and it was kind of richness discussion that unable to fully utilized by E-Collaboration Technology. Face-to-face discussion was somehow needed to discuss things in-depth. The past experience and past performance of people in the organization become factors of trust attributes before the collaborative initiative. They collaborated partners in CS 5 are partly co-located and most of them are remotely located. CS 5 has high impact of technology towards efficiency, but low impact in effectiveness. This condition resulted from the opportunity to have face-to-face meeting with the co-located partner which is more effective to do by face-to-face. In relation to trust development, E-Collaboration Technology give Negligible (low) impact and it was actually hinder the trust development in CS 5.

CASE STUDY REPORTS

CASE STUDY 6

1.0 Introduction

The following report is a summary of information gathered from a set of interviews and discussions at CS 6 on November 2011.

Case Study	Company Name	Interviewees	Date	Durations
CS 6 Decision on investment on production plant (factory & warehouse)	Highland Spring (UK)	Customer, Supply and Logistics Manager	27/11/2012	1 ½ hour

The report is focused on the information gathered regarding the adoption of E-Collaboration Technologies in their collaborative decision-making process. It also to identify the impact of any kind of E-Collaboration Technologies they are using towards efficiency, effectiveness and the trust development between the collaborated partners.

2.0 Case Study Overview

Case Study 6 involved collaborated partners in different departments but at the same organization which is Highland Spring, Scotland. The collaborated partners in this case were Finance Department and Warehouse and Distribution Department from Highland Spring itself. The key decision-maker in this case is the Customer, Supply and Logistics Manager who responsible for most part of the decision and he was the key person who involved in the engagement with the suppliers and making decisions.

CS 6 specifically involved decision about budget locating on production plant. The collaborative decision focus on investment on the production plant including factory and warehousing. The key decision-maker for this collaborative decision is a Customer Supply and Logistics Manager who responsible for most of the decisions made in CS

6. The collaboration activities in CS 6 mainly is a cross department collaboration; internally within the same organization. Because of that situation, E-Collaboration Technology has been used as a method to transfer information instead of method of communications. The E-Collaboration Technology mainly adopted in CS 6 were ERP system (Enterprise Resource Planning) and communication through email. Since most of the key decision-makers in CS 6 are located in the same organization, face-to-face methods is preferable for having a meeting and discussion. However, they were still relying on the data extract from the system (online tools) as a reference to do decision-making. In terms of trust development, it was easier since most the team members have the history of working together in the same organization.

3.0 Nature and category of decision

CS 6 is a strategic, non-routine decision under Conceptual style decision-making and categorized under and categorized under Intellective task types. The collaborative decision focused in CS 6 was a decision about budget locating on production plant including the factory and warehouse. It was an internal collaboration between different departments in the same organization.

4.0 Contextual Factors

Level of risk, CS 6 is a high risk decision where it involves investment decisions in factory and warehousing. Finance department, warehouse department and Supply and Logistics department were involve in this collaborative decision. The decision is a long-term decision category with regards to plan the future of the business.

Level of urgency, CS 6 is a high level of urgency decision. The decision taken was based on the data extracted from the systems where it's related to the decision about future demands and sales as well as production capacity for the following years. Mostly, decision in CS 6 was done at every end of year with regards to the budget planning for the year to come.

Location, the key decision-makers for CS 6 are co-located within the same organization. CS 6 were cross-department collaboration where different sections of the organization worked together to achieve the common goals.

Attitudes towards technology adoption, in CS 6 there were different methods of communication that have been used. The E-Collaboration Technology involved in CS 6 were mainly business process systems such as ERP and EDI. These technology have been using as data input and output and not as a medium of communication. In CS 6, collaborative decisions derived from the output via ERP. ERP able to generate report and figures to assist key decision-maker making decision. However, the attitudes towards using E-Collaboration Technology as a medium of communication were still ambiguous and less open between the key decision-makers.

5.0 Social Factors

With regards to the ***preferences,*** as mentioned in attitudes towards technology adoption in one of the contextual factors earlier, the E-Collaboration Technology adopted in CS 6 was mainly used as data generated system and not preferably used as medium of communication. This condition resulted from the internal condition where CS 6 was internal collaboration between departments in the same organization where face-to-face become the main methods of communication rather than E-Collaboration Technology. However, email were extensively used in their decision-making process.

To mention about ***trust attributes,*** the most important key trust attributes are honesty towards giving information, openness in accepting opinions and to help building relationship better the team members must know each other beforehand.

6.0 Impact of Technology

With respect to ***efficiency,*** based from the interview with the Customer Supply and Logistics Manager (CSLM), E-Collaboration Technology gives Positive impact on efficiency towards assisting collaborative decision-making. Financial data were extracted from the system itself, and it helps them to make collaborative decision from information supplied by the system. The e-collaboration used in the CS 6 also efficient in terms of managing massive amount of data derived input from customers and suppliers.

In relation to ***effectiveness,*** ostensibly E-Collaboration Technology gives Negligible impact on supporting the collaborative decision-making. The CSLM mentioned in the interview that the ERP and EDI systems were efficiently used to generate and manage

extensive data and most of the time they rely on the system's report to make collaborative decision about financial budgeting towards factory and warehouse. But in terms of communication methods such as video conferencing tool and online meeting tool, he prefers to use conventional way (face-to-face) where it requires a lot of conversation and discussion in order to make strategic decision.

With regards to ***trust development,*** the output from the interview with CSLM shows that E-Collaboration Technology gives Positive impact towards trust development. E-Collaboration Technology; which is in this context, it is a business process tool such as EDI and ERP allows the decision makers in CS 6 to do effective collaborative decision and it gives Positive impact towards trust development. Business process tools used in the decision-making has been used to get information, fact and figure in order to assist the collaborative decision-making. It also has been used widely in other level of business process such as ordering and supplying system in operational level.

7.0 Concluding remarks

CS 6 is one of the case in Manufacturing Supply Chain that fully utilize the E-Collaboration Technology in their strategic decision-making. The E-Collaboration Technology mentioned in this case is a business process technology, namely; EDI and ERP which helping them to generate input from the system and not the communication technology such as GoToMeeting as in CS 1 to CS 5. CS 6 is a non-routine strategic decision with high level of risk and urgency. The collaborative decision-making involve in CS 6 was an internal collaboration where people in the same organization, but in different department and job task making decision together to achieve a common goal. Because of the internal factor, the usage of E-Collaboration Technology as a medium of communication was less open and they prefer to have face-to-face meeting. The adoption of E-Collaboration Technology in CS 6 for getting input and output data was giving high impact efficiency but in terms of using it as a medium of communication was low impact in effectiveness. In terms of trust development, the key decision-maker in CS 6 agreed that using the E-Collaboration Technology such as EDI and ERP able to give positive impact in trust development, but not in terms of having an online discussion to do decision-making in the specific issue in CS 6.

CASE STUDY REPORTS

CASE STUDY 7

1.0 Introduction

The following report is a summary of information gathered from a set of interviews and discussions at CS 6 on November 2011.

Case Study	Company Name	Interviewees	Date	Durations
CS 7 Decision on products distribution.	Highland Spring (UK) - Supply Chain Team - Sales Team - Finance Team	Head of Supply Chains Customer, Supply and Logistics Manager	4/11/2012 27/11/2012	1 ½ hour 2 hour

The report is focused on the information gathered regarding the adoption of E-Collaboration Technologies in their collaborative decision-making process. It also to identify the impact of any kind of E-Collaboration Technologies they are using towards efficiency, effectiveness and the trust development between the collaborated partners.

2.0 Case Study Overview

A collaborative decision in CS 7 involves a decision regarding distribution; location of stock, and whether to deliver to the customer or use their backhaul operation - and also the implication on the price at which the products were sold to the customer in question. The key decision-makers in this case were the Customer, Supply and Logistics Manager and the Head of Supply Chain, both are from the Highland Spring company.

3.0 Nature and category of decision

CS 7 is an operational, routine decision under Behavioural style decision-making and is categorized under Decision-making task types. The key decision-makers in CS 7

had a meeting every three months. This decision would use costing, forecast and order history data from the ERP and EDI system, and electronic communication with warehouse operators and hauliers regarding costs. The distribution team, finance and sales team would be involved with these decisions, final decision on logistics from the distribution team, on pricing the decision would be made by the sales team, informed by Finance.

4.0 Contextual Factors

Level of risk: CS 7 is a high level of risk decision. As mentioned by the Customer Supply and Logistics Manager (CSLM), meetings with their suppliers will take place every three months. The collaborative decision in CS 7 is a long-term strategy and to identify the direction of business-to-business between the suppliers and giving benefits to both parties. The Highland Spring retailers including key UK grocers such as Tesco, ASDA, Aldi, Sainsbury's etc.

Level of urgency: in relation to the high level of risk decision, CS 7 is a high level of urgency as well. Every three months, the team led by the Customer Supply and Logistics Manager (CSLM) and the Head of Supply Chain will have a meeting with their customers and suppliers' representative to discuss issues that have arisen in business-to-business activities. This is to ensure that every side of collaboration will receive the latest changes and updates in their systems or working process.

Location: all customers and suppliers are remotely located across the UK.

Attitudes towards technology adoption: in CS 7 the main E-Collaboration Technologies used in order to assist the collaboration decision were ERP and EDI. Data referred from these systems helped partners to plan the strategies and improvements between the business-to-business relationships. In terms of E-Collaboration Technology for the communication part, the result shows that it was less open to adopt this kind of technology to assist collaborative decision-making.

5.0 Social Factors

With regards to the ***preferences*** towards making collaborative decisions, the key decision makers in CS 7 are among the groups that prefer to use conventional methods

which is face-to-face instead of using E-Collaboration Technology to communicate with the remotely located customers and suppliers. Since they are making a strategic decision where it involves the future of the business-to-business relationship, using teleconferencing or e-meeting facilities was not their favourable.

In terms of ***trust attributes,*** the most important aspects that need to be considered in making collaborative decision is CS 7 are the openness and knowing the suppliers and customers in advanced. The trust attributes in CS 7 and CS 6 are the same as mentioned by the CSLM previously.

6.0 Impact of Technology

With regards to the ***efficiency,*** the adoption of E-Collaboration Technology towards assisting the key decision-makers in CS 7 resulted to give Positive impact of efficiency. The E-Collaboration Technology used in the day-to-day business process had been widely used in other aspects as well. EDI and ERP systems are widely known by its competency of managing massive amount of input and output data.

In relation to ***effectiveness,*** seemingly E-Collaboration Technology gives Negligible (low) impact on supporting the collaborative decision-making. As mentioned in the attitudes towards technology adoption, the conventional way like face-to-face was more favourable than using E-Collaboration Technology.

With regards to ***trust development,*** the output from the interview with CSLM shows that E-Collaboration Technology gives Negligible (low) impact towards trust development. This situation comes from the experience when they face the difficulty with the supplier who changing their way of working order and all the technology they are using didn't use the same process as before. This condition had affected the whole process of the business operations.

7.0 Concluding remarks

CS 7 is one of the case that disagreeing the adoption of E-Collaboration Technology in their strategic routine decision with high level of risk and urgency. The decision is CS 7 involved customers and suppliers who were less open to use E-Collaboration Technology as a medium of communication and they are willing to travel back and

forth just to have physical appearance meeting in terms of satisfaction of making strategic decision. The E-Collaboration Technology as a business process tools, such as EDI and ERP were widely used as a data generated purpose to assist the decision-making, based on facts and figures only, but not in terms of using communication technology base. CS 7 got high impact in efficiency but low impact in effectiveness, therefore the trust development was in negative side. The key decision-makers did not agree that using E-Collaboration Technology able to assist them as a medium of communication in making strategic decision, and it only can be used for getting the facts and figures from the data.

CASE STUDY REPORTS

CASE STUDY 8

1.0 Introduction

The following report is a summary of information gathered from a set of interviews and discussions at CS 6 on November 2011.

Case Study	Company Name	Interviewees	Date	Durations
CS 8 Decision on managing order request and processing.	Highland Spring (UK) -Customer Service Team, - Planning team - Sales team	Demand Manager Customer, Supply and Logistics Manager	4/11/2012 27/11/2012	1 ½ hour 2 hour

The report is focused on the information gathered regarding the adoption of E-Collaboration Technologies in their collaborative decision-making process. It also to identify the impact of any kind of E-Collaboration Technologies they are using towards efficiency, effectiveness and the trust development between the collaborated partners.

2.0 Case Study Overview

A collaborative decision involved in CS 8 were related to decision on how to meet orders when exceptional volumes were ordered by customers. The internal collaboration would be between the customer service team, planning team and sales team. The key decision-makers in this case were the Customer, Supply and Logistics Manager and the Demand Manager, both are from the Highland Spring company.

The collaborative decision focused on managing the order requests extracted from the ERP system would include stock levels, recent order history and sales forecast, and data relating to the next planned production timing and volume. The sales orders would

be imported via EDI into the ERP system. They received the orders electronically using the EDI system and some customers place orders via email and fax. CS 8 is a decision that fully relies on the information they obtained from the EDI and ERP systems and they make their decisions accordingly. In terms of communication technologies adopted in CS 8, it was mainly using the basic methods such as email, fax and telephone and the preference for the E-Collaboration Technology methods was high as most of the partners are remotely located.

3.0 Nature and category of decision

CS 8 is an operational, non-routine decision under Directive style decision-making and is categorized under Decision-making task types. It was a day-to-day process of getting ordering from customers through the EDI system. The EDI system was the main system used in CS 8 and some of their customers have invoice verification through EDI and were invoiced electronically from the system as well, while every transaction and business process was operated through the ERP system and order processing system.

4.0 Contextual Factors

Level of risk, CS 8 is a high level of decision category. It is a routine, day-to-day and daily basis activity which require a lot of data extraction and report from the system. CS 8 also involves a lot of financial transaction underneath the orders making by the customers where at some points it worth million pounds.

Level of urgency, since the activity of CS 8 is a daily basis activity, it is a high level of urgency decision. The team who handle the system taking order, processing and handling it every day until it reach the customers demand.

Location, every customers are remotely located across UK and some of them in Europe.

Attitudes towards technology adoption, the teams who handle the ordering process are fully occupied with the EDI and ERP system. Before they get involves in the system, they need to go through some training in order to make sure they know the

flow of the system and how to handle the data input and output from the system. The attitudes towards technology adoption is more open in CS 8.

5.0 Social Factors

With regards to the ***preferences*** towards making collaborative decisions, the key decision-makers in CS 8 agreed that using the e-collaboration system, namely; EDI and ERP are more preferable since all the business activities rely on the information extracted from the system itself.

Trust attributes, in CS 8, the most important aspect to trust build up the trust attributes is the honesty. The honesty in this specific situation means the righteousness of putting information to the system and the ability to put valid and correct information to the system. It is all about trusting the people who handle the system in the organization.

6.0 Impact of Technology

With regards to ***efficiency,*** E-Collaboration Technology used in CS 8, namely; EDI and ERP play vital role in the day-to-day business process. It gives Positive impact on efficiency towards handling the massive amount of data and information.

In the context of ***effectiveness,*** E-Collaboration Technology gives Positive impact on effectiveness context. The data extracted from the system is the main source of getting the order request from customers. However, sometimes there is a technical issues involve with the system as it doesn't work perfectly. In CS 8, as a successful implementation they migrate from the old system to the new one which works more perfect and effective.

With regards to ***trust development,*** E-Collaboration Technology adopted in CS 8, namely; EDI and ERP give Positive impact for trust development. This condition resulted from the awareness with the customers working system and the background of the system they used itself. The system has its own security features where it related to the data input and output from the system.

7.0 Concluding remarks

CS 8 is one of the case in routine decision for operational category with high level of risk and urgency. The E-Collaboration Technology adopted in CS 7 were mainly EDI for getting an order request and processing tools and ERP system to communicate and getting data, facts and figure from their customers. In terms of using E-Collaboration Technology as a medium of getting the order request and processing, the team in CS 8 were fully trained with the system features and they are more open to use the system in operational activities. CS 8 acquired high impact on efficiency and high impact on effectiveness where trust development in the positive side, at the same time it shows that the E-Collaboration Technology as a business process tools, namely; EDI and ERP able to help them making collaborative decision-making.